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Essays on the Organization and Impact of Professional Sports

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To the Graduate School:

This dissertation entitled "Essays on the Organization and Impact of Professional Sports" and written by John Jasina is presented to the Graduate School of Clemson University. I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy with a major in Applied Economics.

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ESSAYS ON THE ORGANIZATION AND IMPACT OF PROFESSIONAL SPORTS

A Thesis

Presented to

the Graduate School of

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In Partial Fulfillment

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by

John Jasina

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Advisor: Dr. Raymond D. Sauer

ABSTRACT

This thesis contains a collection of essays related to economics and sports. The final essay looks at the growing controversy of publicly funded sports stadiums. Local governments are spending millions of dollars on sports stadiums as a means to spur economic development. Economic impact studies supporting public funding claim that the investment will bring thousands of jobs and additional revenue to the local community. Most of the academic literature on the subject has been less favorable. Much of the literature focused on broad measures of employment in metropolitan statistical areas. In this paper regression analysis is used to investigate the impact of an NFL franchise on county employment growth. The goal of the paper is to determine whether there is any measurable economic benefits to justify the use of public funds to built sports stadiums.

The first essay examines the incentive for teams to invest in player talent in open and closed sports leagues. Sports leagues in North America are closed leagues that have a fixed set of teams. Entry is rare, requiring permission from incumbent teams. Outside of North America most leagues are open leagues that practice promotion and relegation. Entry into these leagues is primarily based on team performance. By solving for the equilibrium level of player talent, this research will show that under most conditions teams in an open league will spend more on player talent than teams in a closed league. The practice of promotion and relegation in an open league gives teams an additional incentive to invest in player talent that is not present in a closed league.

The second essay explores entry restrictions across several sports. Many of these sports are open but have several hierarchal levels of competition. Entry into the top tier of competition depends on the players' ability to perform at the lower levels. While most entry rules appear to increase the quality of play, some, such as age restrictions in the WTA, appear to be motivated by cartel behavior.

DEDICATION

I dedicate this work to my Mom and Dad. I could not have accomplished this without their love and support. I also would like to dedicate it to me, the only person I enjoy spending my free time with.

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ENTRY RESTRICTIONS IN LEAGUE SPORTS

Introduction

Most sports leagues in North America are closed leagues. Entry into a closed league requires the permission of league owners and usually involves a large entry fee. Leagues such as the National Basketball Association (NBA), Major League Baseball (MLB), National Football League (NFL) Major League Soccer (MLS) and the National Hockey League (NHL) are all examples of closed leagues. Most sports leagues outside of North America are open leagues. In open leagues, entry is determined by on the field performance. Open leagues are set up in hierarchical divisions and practice promotion and relegation. At the end of each season the worst performing teams in upper divisions are relegated to lower divisions and the best performing teams in lower divisions are promoted to higher divisions.

The primary difference between an open and closed league is the ability for new teams to enter the existing league. Entry into a closed league requires the prior approval of the existing team owners and a large fee. A closed league will expand if there are profit opportunities in cities that do not have a professional team or to prevent entry by a competing league. Most likely a competing league would choose locations that were unexploited by an existing league. In order to prevent competition from the new league the existing league would choose to expand into the unexploited markets. Promotion and relegation in open leagues serves as a means of entry into the major leagues. Anyone could start a team, start competing at the bottom of the league, and gain entry into the

major league over time. One drawback of the open league is that new teams must begin play at the bottom of the league and work their way up to the major league.

The scarcity of teams in a closed league enables teams to extract rents in the form of public subsidies for stadiums. Cities compete with one another to attract a major league team by building elaborate stadiums and granting generous rental agreements. These agreements are attractive to team owners because they increase the market value of the team. Owners receive those rents when they decide to sell their franchise (Sports Economist, 2005). Open leagues reduce the incentive for cities to offer public subsidies for stadiums. A club's threat of relocation is limited since another team can come into the market and take its place. A city will not be willing to spend millions of dollars to attract a major league team since the team always faces the possibility of relegation.

One benefit of a closed league is that it could promote financial stability in the league. Shared monopoly rent can allow a historically small market team, Green Bay in the NFL, to compete at the major league level. In addition to promoting financial stability, some forms of revenue sharing increases competitive balance. Competitive balance adds to the value of the league by providing a more appealing product to fans. It is not unusual to hear stories from English Football about teams in financial trouble. Poorly run teams will go out of business.

The origins of closed leagues in North America lie in the history of baseball. The first baseball league was the National Association of Professional Base Ball Players, or the National Association (NA). The short history of the NA was marred in chaos and mayhem. With no set season to play, teams would just travel around the country playing games from city to city. These baseball tours were loosely organized, at best. Each game

required the tedious tasks of determining the rules and the selection of umpires. This often led to long delays that alienated fans. Betting and gambling were widespread in baseball, during this period and for many years after (Rader, 1994).

In 1876, William Ambrose Hulbert saw an opportunity to supplant chaos with order and formed the National League of Professional Base Ball Clubs, or the National League (NL). Hulbert and his supporters saw the advantage of forming a league that was more like a corporation rather than a league with open membership. Membership in the NL was restricted to teams in the nine largest cities: Boston, Cincinnati, Hartford, Louisville, New York, Philadelphia and St. Louis. Any team wishing to join the new league had to first obtain the permission of the existing clubs. No club in a city with a population under 75,000 was permitted entry (Rader, 1994).

The NL adopted many new practices that were absent from the NA. Players were no longer part of the decision making process, which differed greatly from the player friendly NA. Teams also started a revenue sharing plan to help the teams from smaller cities compete with the larger cities. Visiting teams received 50 percent of the base admission price to each game. Strict rules were put into place that protected a team's local market power. When a league team such as Philadelphia traveled to Boston, they were not allowed to play any other teams from Boston that were not part of the NL. Owners also adopted rules meant to keep player salaries down. No team was permitted to negotiate with another team's players while the season was in progress. In previous leagues, players could walk out on a team in the middle of a season if they received a better offer from another team. In short, the National League was the first successful attempt at cartelizing a sports league. It is important to note, however, that although there

are cartel elements in the NL's structure, these organizational features arguably helped make baseball become a successful commercial enterprise.

While other sports leagues followed the NL's closed league structure, many sports played in North America have more open structures. Participation in open leagues is based on player performance. Players and teams must demonstrate their ability at lower levels before making it to the top level of their sport. However even some sports where entry is achieved on a competitive basis have rules, such as age restrictions, that may be motivated by cartel behavior. Systematic documentation of these rules and analysis of their impact is absent in the literature on the organization of sport. Hence in the next section, we discuss the evolution of rules in these sports.

Professional Golf Association (PGA) Tour

The Professional Golf Association (PGA) Tour, in contrast to the closed nature of the NL, is an open league. The Tour allows any player who demonstrates his ability to compete to participate in PGA events. The origins of the PGA Tour can be traced back to 1968 when the tournament players created their own organization called the Association of Professional Golfers (APG) (PGA Tour, "History," 2005). The APG was short lived and the players eventually agreed to operate the Tournament Players Division. A 10-member Tournament Policy Board governed the Tournament Players Division. In 1975, the Tournament Players Division was renamed the PGA Tour.

Like other individual sports, the PGA Tour is set up as an open league. The overall objective of tour participants is to obtain their PGA Tour Card so they can compete in big money tournaments. Holding a PGA Tour Card earns a player full exempt status on the PGA Tour. Exempt status gives the player priority when signing up

for tournaments. (See Appendix A.) Non-exempt status players must wait to see if there are any open spots in the field or attempt to enter a tournament by playing in qualifying rounds or by receiving various exemptions. Holding a PGA Tour Card alone does not ensure success. PGA Tour Card holders compete to receive priority when signing up for PGA Tour events, with priority is based on performance as shown in the Appendix A.

Table 1. Qualifying for a PGA Tour Card

Current PGA Tour Members	Top 125 on PGA Tour money list retain PGA Tour Card
Nationwide Tour Members	Top 20 on Nationwide Tour money list receive PGA Tour Card
PGA Tour Qualifying Tournament	Low 30 scores and ties in PGA Tour Qualifying Tournament final stage earn PGA Tour Card

(PGA Tour, 2005)

In order to retain their Tour Card, current PGA Tour Card holders must place in the top 125 on the PGA Tour money list. Players not making the top 125 must go to the Nationwide Tour or the PGA Tour Qualifying School, where they can attempt to again earn their PGA Tour Card. (See Table 1.) All players below the 125 on the PGA Tour money list are exempt to the final stage of the PGA Tour Qualifying School Tournament held once a year. The Qualifying Tournament is a three-stage tournament where the number of participants is reduced at each stage. The low 30 scores and ties in the final stage receive their PGA Tour Card and exempt status (PGA Tour, "Background," 2005).

Players on the Nationwide Tour can earn their PGA Tour Card by finishing the season in the top 20 of the Nationwide Tour money list. (See Table 1.) Other players on the Nationwide Tour are exempted in certain rounds of the PGA Tour Qualifying Tournament. Players ranked 21 to 35 on the Nationwide Tour money list are exempt into the final stage of the PGA Tour Qualifying Tournament. Players ranked 36 to 70 are exempt into the second stage of the PGA Tour Qualifying Tournament. Again, the low 30 scores and ties in the final stage of the PGA Tour Qualifying Tournament receive their PGA Tour Card. (See Table 1.)

Table 2. Qualifying for Membership on the Nationwide Tour

PGA Tour Member	Top 25 after the 125th position on the PGA Tour money list
Nationwide Tour Members	Win a Nationwide Tour event
	Finish 21-60 on Nationwide Tour Money List
Qualifying Tournament Participants	Finish within top 80 and ties at annual Qualifying Tournament

(PGA Tour, 2005)

In addition to competing for their PGA Tour Cards, players are competing to retain their status on the Nationwide Tour. Players finishing within the top 80 and ties at the PGA Tour Qualifying Tournament receive exempt status on the Nationwide Tour. (See Table 2.)

Another way to receive or retain exempt status on the Nationwide Tour is to win a Nationwide Tour event. (See Table 3.) Players winning an official Nationwide Tour

event receive exempt status for the remainder of the season and the next season. Players finishing 21-60 on the Nationwide Tour money list receive exempt status on the Nationwide Tour; the top 20 receive their PGA Tour Card. In addition to these, players can participate in Nationwide Tour events by participating in qualifying tournaments or by being a sponsor's selection.

Table 3. Qualifications for the PGA Tour Qualifying Tournament

Exempt into First Stage	Any person with PGA handicap of +2 or better
Exempt into Second Stage	Survivors of the First Stage
	PGA Tour members
	Winners of Nike Tour, Buy.com Tour and Nationwide Tour Events
	Certain members of European Tour, Japan Golf Tour, Australian PGA Tour, Southern Africa Tour, Asian Tour and Canadian Tour
Exempt into Final Stage	PGA Tour members who finished among the top 25 immediately after the 125th position on the PGA Tour money list
	Players finishing 21-35 on the Nationwide Tour money list
	Top three available players from the PGA European Tour, Japan Golf Tour and Australian PGA Tour money lists

(PGA Tour, 2005)

Players from around the world qualify for competition in the PGA Tour Qualifying Tournament. The minimum qualification for entry into the Qualifying Tournament is a documented handicap of +2 or lower. Again, certain Nationwide Tour members can earn exemptions into different stages of the PGA Tour Qualifying

Tournament. Several players are exempt into the second stage: PGA Tour members from the previous year, winners of Nike Tour, Buy.com Tour and Nationwide Tour events in the current and previous five years, and certain members of the PGA European Tour, Japan Golf Tour, Australian PGA Tour, Southern Africa Tour, Asian Tour, and Canadian Tour. There are many other ways for players to exempt into the second stage of the Qualifying Tournament. (See Table 3.) This study focuses on the players who can move from one tour to another.

Several players may also exempt into the final stage of the Qualifying Tournament. (See Table 3.) These players include PGA Tour members who finished among the top 25 immediately after the 125th position on the PGA Tour money list, players finishing 21-35 on the Nationwide Tour money list, and the top three available players from the PGA European Tour, Japan Golf Tour and Australian PGA Tour money lists.

If we accept the PGA Tour as the major league in golf, Tables 1-3 show that golf is in fact an open league. Competition is not limited to a fixed set of PGA Tour members. Players from all over the world have an opportunity to compete for a PGA Tour Card. The determinant of promotion to the PGA and success in golf is performance.

Professional golf has not always been so open. In the early 1900's, golf was a sport for the wealthy. This meant that minority players, mainly blacks, could not participate in PGA events. The PGA actually had a Caucasian only bylaw (Gabriel, 2001). The United Golfers Association was formed in response to the constant discrimination against blacks. The UGA had many outstanding golfers including Bill

Spiller, Lee Elder and Charlie Sifford. Sifford became the first black player to win a PGA-affiliated event when he captured the 1957 Long Beach Open, which was not an official event because it was only 54 holes. He later won two PGA Tour events, the 1967 Greater Hartford Open and the 1969 Los Angeles Open. Lee Elder became the first black player to play in the 1975 Masters in Augusta (Gabriel, 2001).

Things began to change when in 1960 the attorney general in California told the PGA that they could not use public courses in California if there was any discrimination. The PGA countered that they would play on private courses, but the attorney general warned that would be illegal as well. The PGA gave in and dropped its Caucasian only rule. Black players continued to find it difficult to participate in PGA events, however, even after the elimination of the bylaw. Black players were prevented from entering locker rooms, clubhouses and sometimes even prevented from entering a golf course not only in the South but also throughout the country. Two recent events helped to solidify minority's presence in modern golf. In 1994, Tiger Woods became the first minority golfer to win a major amateur event at Shoal Creek. Years before the owner of Shoal Creek stated that he was not interested in having blacks join his club. Tiger Woods also won the Masters at Augusta National, a private club that was once segregated, and still does not allow women members.

Ladies Professional Golf Association (LPGA)

The Ladies Professional Golf Association (LPGA) was established in 1950. The 13 founding members included Alice Bauer, Patty Berg, Bettye Danoff, Helen Dettweiler, Marlene Bauer Hagge, Helen Hicks, Opal Hill, Betty Jameson, Sally Sessions,.Marilynn Smith, Shirley Spork, Louise Suggs, and Babe Zaharias. The

LPGA's roots can be traced back the Women's Professional Golf Association (WPGA), which was established in 1944, but only lasted 5 years. Modeled after the WPGA, the LPGA's purpose is to promote women's golf and create opportunities for women in professional sports (LPGA, "Timeline," 2005).

Clearly, the LPGA discriminates, as it is restricted to ladies. But just as clearly, this restriction is necessary to the survival of professional golf for women. In the absence of the restriction, more powerful, longer-hitting males from lesser tours would enter LPGA tournaments and win virtually all of the prize money. The restriction adds value in the overall marketplace by making possible a tour in which women can display skills in meaningful competition.

In 1950 the LPGA had only 14 events with total prize money of $50,000. By the end of the decade players competed in 26 tournaments with $200,000 in prize money. The success of the LPGA continued into the 1960's when the final round of the 1966 US Women's Open became the first LPGA event televised nationally. In the 1980's, the LPGA benefited from increased corporate sponsorship and increased media exposure. In 1989, players competed in 36 tournaments with an average purse of $385,000 for each tournament. Today, the LPGA Tour includes 34 events with total prize money of $45 million. Players like Annika Sorenstam and Juli Inkster earn over $1 million a year.

Part of the LPGA's success can be attributed to the quality of play by its participants. The LPGA has adopted an open league that requires players to constantly maintain and improve their skills. Players are classified as being exempt or non-exempt. Exempt status means that players are almost guaranteed a spot in the field of any tournament that they wish to play. Non-exempt players are able to compete in LPGA

events, but only if there are any spots open after the exempt players have signed up for the event. Priority during sign up is given to exempt players. The goal of every player is to obtain exempt status. Exempt status translates into more playing opportunities and higher earning potential.

At any one time there are 144 exempt players on the LPGA Tour. There are several ways players can gain exempt status; all of them based on performance: the Futures Golf Tour, the LPGA Tour Qualifying School and the top 90 players on the LPGA money list. (See Table 4.)

The Futures Tour was founded in 1981 with the purpose of providing women with the opportunity to improve their golf skills so they could advance to the LPGA. That goal has not changed and the Futures Tour has been formally called "the official developmental tour of the LPGA" since a formal agreement with the LPGA in 1999. Currently the Futures Tour includes 18 tournaments with a total prize of almost $1.25 million. The top 5 players on the Futures Tour money list automatically obtain exempt status on the LPGA Tour, provided they compete in a minimum of six tournaments. Players ranked 6 through 10 get automatic entry into the LPGA Final Qualifying Tournament.

Besides the competition for LPGA exempt status, players are also competing to remain Futures Tour members. There are several ways players can become eligible to play on the Futures Tour. Players who finish or tie in the top 90 on the Futures Tour money list are automatically eligible to compete on the Futures Tour the following season stated S. Allen at the LPGA (personal communication, 2005). Players who completed 72 holes at the LPGA Final Qualifying Shirley Tournament, but did not receive LPGA

exempt status and who were not in the top 90 Futures Tour money list are granted Futures Tour eligibility. Players can gain eligibility by competing at the Futures Tour Qualifying Tournament. There are also several spots left open for top ranked amateurs and collegiate players and Futures Tour special invitations. There are several more sub-categories of players that are eligible to play on the Futures Tour, but the important point is that even at the lower levels, eligible women must be at the top of their game.

In addition to the Futures Tour, the LPGA Tour Qualifying School holds a series of events every year where players can earn LPGA exempt status. The event begins with two section qualifiers, one held in Florida and the other in California. The top 30 players from each of the sectional qualifiers then go on to compete in a Final Qualifying Tournament. The size of the field at the sectional qualifiers and the Final Qualifying Tournament varies from year to year. In 2003 there a field of 132 players competed for 28 LPGA exempt cards.

Table 4. Qualifying for LPGA Exempt Status

Current LPGA Tour Players	Top 90 on money list
Futures Tour Players	Top 5 on Futures Tour money list are granted LPGA exempt status
	Players ranked 6 through 10 on the Futures Tour money list advance to the LPGA Final Qualifying Tournament
LPGA Tour Qualifying School	Two Sectional Qualifiers: Top 30 players from each advance
	Final Qualifying Tournament: Number of exemptions varies

(LPGA, "Exempt," 2005)

For those already competing on the LPGA, the top 90 players on the LPGA money list receive exempt status for the following season. The next 5 players are eligible to compete in Futures Tour events. For the remaining players, the journey starts all over again. It's back to trying to qualify for Futures Tour events or competing at the LPGA Tour Qualifying School. (See Table 4.)

Like the PGA Tour, women's professional golf is also an open league. Competition is not limited to a fixed set of LPGA Tour members. Players from all over the world have an opportunity to compete for a LPGA Tour Card. The determinant of promotion to the LPGA and success in golf is performance of the players.

Association of Tennis Professionals (ATP)

The Association of Tennis Professionals (ATP) was formed in 1972. It wasn't until 1988 that the ATP seized control and replaced the Men's Tennis Council as the governing body of the circuit. The news conference to announce the leadership change was held in a parking lot because US Open officials barred players from using any on-site facilities (ATP, "Organization," 2005).

Men's professional tennis is divided into several divisions: Grand Slams, ATP Tournaments, Challenger Series Tournaments and Satellite Series Circuits and Futures. The ATP governs Challenger Series Tournaments and ATP Tournaments including: Tennis Masters Cup, World Doubles Championship, World Team Championship, ATP Masters Series Tournaments, International Series Gold Tournaments and International Series Tournaments.

Acceptance into the main draw of ATP and Challenger tournaments is based on a player's computer ranking. The higher a player's computer ranking the higher they are

seeded in the main draw. Generally higher seeded players face players of lower quality in the early rounds of a tournament. Players not initially accepted into the main draw can enter a qualifying tournament before the main event. The number of players accepted into the main draw after completion of the qualifying tournament differs between events. Other players can gain entry into the main draw by receiving wild cards. Wild cards are usually given out when the tournament committee has difficulty filling all of the spots in the main draw. Some spots may also be filled through sponsor exemptions.

Although entry is primarily based on individual player ability to compete at the professional level, the ATP does have strict age limitations. (See Table 5.) No player under the age of fourteen can compete in an ATP or Challenger Series tournament. Players who are fourteen year old are eligible for entry into a maximum of eight ATP or Challenger Series tournaments. Players who have reached their fifteenth birthday are eligible for entry into a maximum of twelve ATP or Challenger Series tournaments. Players aged sixteen or older are not limited in the number of tournaments they may enter.

Table 5. Age Restrictions for the ATP and Challenger Series Tournaments

Age	ATP Tournaments and Challenger Series
16 and Older	Unlimited
15	12
14	8
< 14	0

(ATP, 2005)

The only other restrictions imposed by the ATP are play-down restrictions and voluntary commitment requirements. These restrictions are pro-competitive since they require higher ranked players to forgo competing in low-level tournaments to compete in top tournaments. Players ranked 1-10 in the singles ranking are prohibited from entering, accepting a wild card and/or competing in a Challenger Series Tournament. Players ranked 11-50 are prohibited from entering, accepting a wild card or competing in Challenger Series Tournaments that offer less than $50,000 in prize money. The ATP has an incentive to maintain a high quality of play in its top tournaments. Play-down restrictions ensure that the highest ranked players in the world will be competing in the top events. These restrictions help to bring in sponsorship dollars by increasing demand for the event. The commitment agreement is voluntary. A Commitment Player is any player ranked in the top 50 in points that has signed a commitment agreement to the ATP. The agreement states that the player will participate in the singles event of all ATP Masters Series Tournaments for which he is accepted, the Tennis Masters Series and 2 International Series Gold Tournaments. There does not appear to be any benefit to signing the commitment agreement. A player is not guaranteed a position in the main draw of any of the above tournaments if he signs the commitment agreement.

Women's Tennis Association (WTA)

The Women's Tennis Association (WTA) was formed in 1973 in a London hotel room (WTA Tour, "Stories," 2005). A group of nine female tennis players, most notably,

Billy Jean King, were enraged by the disparity in prize money between men's and women's tennis. The 1970 Pacific South West Open paid the men's champion $15,000 and the women's champion $1,500. Today the WTA is a worldwide sports league with over 1,000 players from 71 countries. The 2005 season will feature 63 events with prize money totaling more than $57 million. (See Table 6.)

Women's tennis is divided into three divisions. The top division is the WTA tour. Within the WTA are the Grand Slam, Tour Championships and Tier tournaments. The Grand Slam tournaments are the US Open, French Open, Wimbledon, and the Australian Open. The Tour Championships is a single tournament held at the end of each season with prize money over $3 million. Tier tournaments are ranked by total prize money available from tier one to tier five (WTA Tour, "Tier,"2005). (See Table 6.) The next division is the ITF Women's Circuit tournament. Below the ITF are exhibition and non-tour tournaments.

Table 6. Tier Tournaments Ranked by Total Prize Money

Tier	Prize Money
I	$1,262,000
II	$585,000
III	$170,000
IV	$140,000
V	$110,000

(WTA Tour, "Tier," 2005)

Priority in tournament draws is based on a players ranking. The higher a player's ranking, the higher her position in the main draw of a tournament. Like men's tennis, higher seeded players generally start off playing lower quality players in a tournament. Advancement in tournaments and in the player rankings is based on performance. Players are rewarded for their ability to compete.

Table 7. WTA Age Restrictions

Age	WTA Tour	ITF Women's Circuit	Grand Slams	Wild Cards	Exhibition and Non-Tour Events
18	Unlimited	Unlimited	All	According to Tour Rules	Unlimited
17	13 + Champs		Any she qualifies for by ranking	4	4
16	10 + Champs		Any she qualifies for by ranking	3	3
15	8 + Champs		Any she qualifies for by ranking	3	2
14	0 Except for Wild Card or Feed Up	7	0	3	1
13	0	0	0	0	0

(WTA Tour, "Age," 2005)

The WTA has several restrictions for player eligibility and age is one of them. (See Table 7). Players under the age of fourteen may not participate in any WTA Tour or ITF Women's Circuit tournaments. Players age fifteen may only participate in seven ITF

tournaments and one exhibition or non-tour event. Of the seven ITF events, only four may be for prize money greater than $10,000. The number of wild cards these players are able to receive is also limited. Players age fifteen may only participate in eight professional tournaments plus the Championships, if she qualifies, and three exhibition or non-tour events. Players age sixteen may participate in a maximum of ten professional tournaments plus the Championships, if she qualifies, and three exhibition or non-tour events. Players age seventeen may participate in a maximum of thirteen professional tournaments plus the Championships, if she qualifies, and four exhibition or non-tour events. Players age eighteen and older may participate in an unlimited number of professional tournaments on the WTA Tour and ITF Women's Circuit (WTA Tour, "Age," 2005).

Table 8. WTA Exempt Players Commitment Requirements

Player Rank	Commitment
Gold	
1-6	13 Tier 1 or Tier 2 Tournaments (minimum of 5 Tier 1)
7-10	12 Tier 1 or Tier 2 Tournaments (minimum of 5 Tier 1 and 1 Tier 3)
11-13	11 Tier 1 or Tier 2 Tournaments (minimum of 5 Tier 1 and 2 Tier 3)
14-20	3 Tier 2 Tournaments
Silver	
21-30	2 Tier 3 Tournaments
31-52	2 Tier 4 Tournaments

(WTA Tour, "Exempt," 2005)

There are also minimum commitment requirements for players ranked 1 through 52. Gold exempt players, players ranked 1 through 20, are required to enter a certain number of tier tournaments throughout the season. The remaining players, ranked 21 through 52, are silver exempt players. These players are required to enter a certain number of tier 3 and tier 4 tournaments. The number of tournaments and the tier depends on a players ranking. (See Table 8.) These commitment requirements ensure that the top ranked players in the world show up for the big tournaments. Without these commitments, players would not participate and fan and sponsorship dollars would disappear (WTA Tour, "Exempt," 2005).

The entry restrictions imposed by the WTA are a bit more problematic. While most sports have some age requirements, the WTA rules seem to go far beyond those sports. These age restrictions in the WTA could be motivated by cartel behavior. Existing WTA members over the age of 18, impose these rules to keep out younger talent. We see these restrictions in major league sports in North America so it is easy to see how they are a product of cartel behavior. It may worthwhile to study the age restrictions in the WTA in greater detail.

Professional Bowlers Association (PBA)

Eddie Alias started the Professional Bowlers Association (PBA) in 1958. The PBA was a not for profit entity that was responsible for setting up tournaments and getting commercial sponsors. In its first year of operation the PBA had only three

tournaments. By 1963 there were 38 tournaments, many of which could be seen on national television (PBA, 2005).

The following decades could be characterized as successful for the PBA. The number of corporate sponsors grew year to year and several players earned relatively high incomes. In 1997, Brunswick signed a three-year, $3 million sponsorship package that included the sponsorship of three tournaments per year. In 1999, Johnny Petraglia became the twentieth player in PBA history to break the $1 million career earning mark. Attendance grew as well, in 1995 a PBA record 7,212 fans attending the US Open tournament in Detroit's Joe Lewis Arena.

Big changes came to the PBA in 2000 when former Microsoft executives Chris Peters, Mike Slade and Rob Glaser purchased the PBA and turned it into a for-profit business. In an effort to increase its membership and tournament entries, the PBA announced it would create a set season with 20 tournaments. Total prize money for the tournaments was over $4 million. In addition to these moves, the PBA signed a three-year exclusive deal with ESPN that gave tournaments move consistent television coverage. Television ratings increased 18% that year.

The biggest changes from the new owners of the PBA were announced for the 2004-05 season. Each of the 16 standard tournaments will feature an all-exempt 64-man field. Of those 64 entries, 40 will have exempt status for the full tour season. These 40 exemptions are based on the previous seasons champions and points leaders. Seven additional exemptions come from point leaders from the seven PBA regions. Eleven players can gain season exempt status based on their performance at the PBA Tour Trials. The PBA Tour Trials are completely new to the PBA. The PBA will hold five daily

tournaments on different lane conditions. Points are awarded based on a player's finish each day. After all five events, the top eight point leaders earn a full season exemption. In addition to exempt players, 5 players can gain entry into a tournament in weekly qualifying tournaments and 1 player will obtain a commissioner exemption (PBA, 2005).

Prior to the above changes, a tour player could be exempt. However, exempt status only gave entry priority onto a tournament. The field for any particular event was determined by the size of the bowling center. A 40 lane bowling center would have a maximum field size of 160. C. Kistner, (personal communication, 2005) Coordinator of the PBA Tour, stated that the top 50 players from the previous year received exempt status, which guaranteed that they would not be shut out of a tournament stated.

Table 9. PBA Tournament Field and Season Exempt Status

Tournament Field, Total of 64 players	
40 season exempt players	Based on previous season tour champions and points leaders
7	Point leaders from the seven PBA regions
11 season exempt players	Based on performance at Tour Trials
5 players	Weekly qualifiers
1 player	Commissioner's exemption

(PBA, 2005)

Why the change? The owners of the league and the participants in bowling tournaments are separate entities. The owners of the league want to maximize profit. In order to do that they must sign lucrative sponsorship deals and television contracts. It would be difficult to sign sponsorship deals if the quality of play was low. Creating a league structure that is open and based on player performance increases the effort from league participants and increases the overall effort and performance of the league. In short, the open system creates a better product that is more appealing to fans. This in turn will attract more sponsorship deals and better television contracts.

Professional bowlers would most likely be unhappy with these changes. The changes mean more effort, hence higher costs, in order to obtain the season exemptions. One change that favors tournament participants is a guaranteed prize. All tournament participants will receive some compensation, even those finishing last. This gesture by league owners may be an attempt to fend off criticism from players by compensating them for their increased effort.

Conclusion

Sports leagues can be characterized as open or closed. Entry into a closed league is based on one's ability to pay existing league owners an entry fee. Entry into an open league is based on performance. Each of the sports discussed in this paper are individual sports where entry is based on player performance.

Corporations are only willing to sponsor competitive tournaments that have the potential to attract a large number of fans. This gives the organizers of the sports league the incentive to create an open league that increases the quality of play. Limiting competition among players would decrease the quality of play and limit the available

sponsorship dollars. The WTA is a perfect example of these different incentives coming together to form an open league sport based on player performance. Female tennis players were unhappy with the prize money available to them, so rather than limit competition and create a closed league, they created an open league based on player performance. The result has been an increase in tour sponsorship and an increase in available prize money.

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PROMOTION AND RELEGATION IN SPORTS

Introduction

The purpose of this study is to determine whether open sports leagues that use a system of promotion and relegation will increase economic welfare by increasing spending by teams, when compared to closed sports leagues. Teams want to avoid relegation because relegation means playing in a division with lower revenue generating potential. Generally the quality of play is lower than in the top division and fan interest is lower which implies lower revenue for teams that face relegation. The potential for teams to play in the top division with greater revenue potential and the possibility of winning the championship gives minor league teams an incentive to invest in more player talent than teams in a closed league. Promotion and relegation adds an additional dimension to league play that is not present in a closed league. The additional incentive to invest in player talent will increase consumer surplus since teams seek promotion to the top division while trying to avoid relegation. In general, competitive pressure will raise the overall quality of play in an open league above that in a closed league.

Open Versus Closed Leagues

Most North American sports leagues are closed leagues that operate with a fixed set of teams season to season. All of the major sports leagues in North America, Major League Baseball, National Basketball Association, National Hockey League and the National Football League are closed leagues. Entry or expansion of the league is rare, granted by existing teams owners, and is typically accompanied by a large fee. Since

1995 four teams have entered the NFL. The Carolina Panthers and the Jacksonville Jaguars began play in 1995 and the Houston Texans began play in 2002. The Texans were allowed to enter the NFL after a $700 million payment to the league. A fourth team, Cleveland Browns, was allowed to play after the existing franchise left town for Baltimore. Based on 2004 Forbes estimates, the NFL is the most valuable league in North America with a total franchise value of $23.4 billion and income of $850 million on revenue of $5.33 billion. The only NFL team to lose money in 2004 was the Cardinals. The NHL is North America's least valuable league.

Outside of North America most leagues are open leagues. Open leagues are set up with several hierarchical divisions and use a system of promotion and relegation. The primary determinant of promotion and relegation is on field success. At the end of each season the worst performing teams in the top division are relegated or demoted to the lower division and the best performing teams in the lower division are promoted to the top division. Unlike the NFL entry in English soccer is not rare, over eleven seasons between 1992 and 2003 36 different teams have competed in the Premier League. Over the same period 54 different teams have competed in Division 1, 61 in Division 2 and 51 in Division 3. Noll (2002) states that the average revenue for teams in the English Premier League in 2000 exceeded $50 million with average profit per team of $5 million. The market cap of the most valuable team in the Premier League, Manchester United, is around $1 billion.

The structure of a league may have consequences for conduct and performance and the antitrust treatment of sports. The primary difference between an open and closed league is ability for new teams to enter the existing league. As stated above, entry into a

closed league requires the prior approval of the existing team owners and a large fee. A closed league will expand if there are profit opportunities in cities that do not have a professional team or to prevent entry by a competing league. Most likely a competing league would choose locations that were unexploited by an existing league. In order to prevent competition from the new league the existing league would choose to expand into the unexploited markets. Promotion and relegation serves as a means of entry into the major leagues. Any person could start his or her own team, start competing at the bottom of the league and gain promotion to the major league over time. Or a person could purchase an existing minor league team and hire quality players and coaches and achieve the same result. Entry in an open league does not require approval by or a franchise fee to existing team owners. Entry is based on the ability to compete not the ability to pay existing owners a fee.

One drawback of the open league system is that new teams must start at the bottom of the league and gain promotion to the major league. The history of Rushden and Diamonds is an interesting story in English soccer. In 1992 two teams, Rushden Town and Irthlingborough Diamonds merged to form Rushden and Diamonds. Prior to the merger Rushden was relegated to the Southern League Midland Division because their facilities were deemed unfit for Premier Division football, and Diamonds competed in the United Counties League. The merged team was able to reach Football League status after 9 years.

The ability to restrict entry in closed leagues enables teams to extract monopoly rents through higher ticket prices, higher prices for local television contracts and public subsidies for stadia and other facilities. Since there are no alternative competitors in the

local market teams can charge monopoly prices for tickets to their games. Teams are able to exercise market power for local television contracts. The lack of competing teams in their market raises the price that teams are able to charge. The league also imposes blackout rules, which force fans to purchase tickets to the event before the league broadcasts the event on local stations. The lack of competition in the local market means teams are able to get large public subsidies for stadiums and other facilities.

In open leagues teams have little monopoly power. It is conceivable that a city could have more than one team competing in the same sport and even in the same league. There are currently nine teams in London that compete in the two tiers of the English Football League. With the presence of competition a team would not be able to charge monopoly prices for ticket. The presence of alternatives keeps ticket prices near competitive levels. The same principle applies to television contracts. Television stations would not be willing to pay monopoly prices for contracts when credible alternatives are present. The presence of alternatives also reduces the incentive for cities to pay subsidies to teams using public funds. A club's threat of relocation is limited since the team itself may be relegated and since there is a credible threat of entry from new teams.

Another advantage of promotion and relegation is that it would eliminate meaningless games that are prevalent in North American sports. In North American sports it becomes clear at some point during the season that a few teams will not compete for the championship that year. These teams usually sell or trade their quality players and field an inferior team the remainder of the season. This practice is encouraged by the fact that there are no penalties for coming in last. In most North American leagues the

teams that come in last are rewarded with the highest pick in the draft the next year. Meaningless games are less competitive and less desirable to fans. In an open league teams compete for the right to be promoted, but also to avoid relegation. Teams not in contention for the league championship have the incentive to field the best quality team they can, all season long.

Adopting the model from Szymanski and Ross (2000) and Szymanski and Valletti (2002), it can be shown that teams tend to spend more on talent in an open league than in a closed league. The increased spending on player talent means that teams in an open league will be less profitable than teams in a closed league. This essay shows that the Szymanski and Ross model implies that aggregate spending is higher for an open league and aggregate profit is lower. Relegation means competing in a lower division with less revenue generating potential. Teams will spend more on player talent to avoid relegation. The prospect of promotion to a higher division with more revenue generating potential causes teams in the lower division to spend more than they would in a closed league. These results are consistent with Noll (2002). Noll concludes that, holding all else constant, leagues that practice promotion and relegation will have stronger teams than leagues that are closed.

Major League Soccer (MLS), the top soccer league in the United States, will always be weaker than teams from the top leagues in Europe because the MLS does not practice promotion and relegation. Szymanski and Valletti (2002) consider a case with two large market teams and two small market teams and find that the difference between the strength of the two markets determines the total effort in the league. As the

difference between the markets increases, total league effort increases, but they were unable to generalize any results for their asymmetric model.

Models

Open League

A two period model is developed in this study so that investment in talent in the first period is affected by the prospect of promotion or relegation. Assume that large market teams, teams 1 and 2, start in the top division and small market teams, teams 3 and 4, start in the lower division. First period expected profit for large market teams can be written as

$$E(\pi_1) = \frac{t_1}{t_1 + t_2}(\mu + \delta D_{\mu 1}) + \frac{t_2}{t_1 + t_2}\delta D_{\mu 2} - t_1$$

where $D_{\mu,1}$ is the expected profit of a large market team from retaining a place in the top division and $D_{\mu,2}$ the expected profit following relegation to the lower division. The drawing power of large market teams is μ which is assumed to be greater than one and δ is the discount rate.

First period expected profit for small market teams is

$$E(\pi_3) = \frac{t_3}{t_3 + t_4}(\lambda + \delta D_1) + \frac{t_4}{t_3 + t_4}\delta D_2 - t_3$$

D_1 is the expected profit of a small market team from promotion to the top division and D_2 is the expected profit from remaining in the bottom division. The drawing power of a small market teams is λ which is assumed to be less than one. Maximizing each of these functions with respect to talent, t_i, gives

$$t_1^* = t_2^* = \frac{1}{4}\left[\mu + \delta\left(D_{\mu 1} - D_{\mu 2}\right)\right]$$

$$t_3^* = t_4^* = \frac{1}{4}\left[\lambda + \delta\left(D_1 - D_2\right)\right]$$

These terms generalize for n teams in the top division and for n teams in the lower division

$$t_i = \frac{n-1}{n^2}\left(\mu + \delta\left(D_{\mu,1} - D_{\mu,2}\right)\right)$$

$$t_i = \frac{n-1}{n^2}\left(\lambda + \delta\left(D_1 - D_2\right)\right)$$

Assuming team 2 is demoted to the lower division and team 3 is promoted to the top division, the second period expected profit for each team is the second period is

$$E\left(\pi_1^2\right) = \frac{t_1}{t_1 + t_3}\mu - t_1$$

$$E\left(\pi_3^2\right) = \frac{t_3}{t_1 + t_3} - t_3$$

$$E\left(\pi_2^2\right) = \frac{t_2}{t_2 + t_4}\mu\lambda - t_2$$

$$E\left(\pi_4^2\right) = \frac{t_4}{t_2 + t_4}\lambda - t_4$$

Maximizing each of the above equations with respect to team spending on talent and solving for second period investment in talent results in

$$t_1^{2*} = \frac{\mu^2}{(1+\mu)^2}$$

$$t_3^{2*} = \frac{\mu}{(1+\mu)^2}$$

$$t_2^{2*} = \frac{\lambda\mu^2}{(1+\mu)^2}$$

$$t_4^{2*} = \frac{\lambda\mu}{(1+\mu)^2}$$

Given the values above we can solve for second period expected profit.

$$\pi_1^2 = D_{\mu,1} = \frac{\mu^3}{(1+\mu)^2}$$

$$\pi_3^2 = D_1 = \frac{1}{(1+\mu)^2}$$

$$\pi_2^2 = D_{\mu,2} = \frac{\lambda\mu^3}{(1+\mu)^2}$$

$$\pi_4^2 = D_2 = \frac{\lambda}{(1+\mu)^2}$$

These values can be generalized for n-teams per division.

$$t_1^{2*} = \frac{(n-1)\mu(k\mu-(k-1))}{(k\mu+(n-k))^2}$$

$$t_2^{2*} = \frac{(n-1)\lambda\mu((n-k)\mu-(n-k-1))}{(k+(n-k)\mu)^2}$$

$$t_3^{2*} = \frac{(n-1)\mu((n-k)-(n-k-1)\mu)}{(k\mu+(n-k))^2}$$

$$t_4^{2*} = \frac{(n-1)\lambda\mu(k-(k-1)\mu)}{(k+(n-k)\mu)^2}$$

$$\pi_1^2 = D_{\mu,1} = \frac{(k\mu-(k-1))^2\mu}{(k\mu+(n-k))^2}$$

$$\pi_2^2 = D_{\mu,2} = \frac{((n-k)\mu-(n-k-1))^2\lambda\mu}{(k+(n-k)\mu)^2}$$

$$\pi_3^2 = D_1 = \frac{((n-k-1)\mu-(n-k))^2}{(k\mu+(n-k))^2}$$

$$\pi_4^2 = D_2 = \frac{((k-1)\mu-k)^2\lambda}{(k+(n-k)\mu)^2}$$

The subscripts represent teams that are promoted and relegated in each division. Assuming that there are n-teams per division, team 1 represents the values for any large market team that remains in the top division while team 2 represents the values for any large market team relegated to the lower division. Team 3 represents the values for any small market team promoted from the lower division to the top division while team 4 represents the values for small market teams that remain in the lower division.

It is possible to expand the model to include the number of teams that are promoted and relegated, variable k. For simplicity it is assumed that the number of teams promoted is the same as the number of teams relegated.

Inserting the values for $D_{\mu,1}$ and $D_{\mu,2}$ into t_1^{1*} and D_1 and D_2 into t_3^{1*} yields

$$t_1^{1*} = t_2^{1*} = \frac{1}{4}\left[\mu + \frac{\delta(1-\lambda)\mu^3}{(1+\mu)^2}\right]$$

$$t_3^{1*} = t_4^{1*} = \frac{1}{4}\left[\lambda + \frac{\delta(1-\lambda)}{(1+\mu)^2}\right]$$

Generalized for n-teams per division and k number of teams being promoted and relegated results in a first period investment in talent for large market teams and small market teams

$$t_1^{1*} = t_2^{1*} = \frac{n-1}{n^2}\left(\mu + \delta\left(\frac{(k\mu-(k-1))^2\mu}{(k\mu+(n-k))^2} - \frac{((n-k)\mu-(n-k-1))^2\lambda\mu}{(k+(n-k)\mu)^2}\right)\right)$$

$$t_3^{1*} = t_4^{1*} = \frac{n-1}{n^2}\left(\lambda + \delta\left(\frac{((n-k-1)\mu-(n-k))^2}{(k\mu+(n-k))^2} - \frac{((k-1)\mu-k)^2\lambda}{(k+(n-k)\mu)^2}\right)\right)$$

Nothing is gained by further simplification of these results. Once the values for $D_{\mu,1}$, $D_{\mu,2}$, D_1, D_2, t_1^{1*} and t_3^{1*} are calculated, it is possible to then calculate first period expected profit for teams in each division. We obtain the following solutions:

$$\pi_1^1 = \pi_2^1 = \frac{1}{4}\left[\mu + \delta\left(\frac{(1+3\lambda)\mu^3}{(1+\mu)^2}\right)\right]$$

$$\pi_3^1 = \pi_4^1 = \frac{1}{4}\left[\lambda + \delta\left(\frac{1+3\lambda}{(1+\mu)^2}\right)\right]$$

For n-teams per division and k number of teams being promoted and relegated first period expected profit is

$$\pi_1^1 = \pi_2^1 = \frac{1}{n^2}\left(\mu + \delta\left(\frac{(k\mu-(k-1))^2\mu}{(k\mu+(n-k))^2} + \frac{(n^2-1)((n-k)\mu-(n-k-1))^2\lambda\mu}{(k+(n-k)\mu)^2}\right)\right)$$

$$\pi_3^1 = \pi_4^1 = \frac{1}{n^2}\left(\lambda + \delta\left(\frac{((n-k-1)\mu-(n-k))^2}{(k\mu+(n-k))^2} + \frac{(n^2-1)((k-1)\mu-k)^2\lambda}{(k+(n-k)\mu)^2}\right)\right)$$

Closed League

Initially it is assumed that the closed league is made up of two large market teams. Expected profit each period can be written as

$$E(\pi_1) = \frac{t_1}{t_1+t_2}\mu - t_1$$

The profit maximizing investment in talent and expected profit in each period will be

$$t_1^* = t_2^* = \frac{\mu}{4}$$

$$\pi_1 = \pi_2 = \frac{\mu}{4}$$

Szymanski and Ross give expected profit as

$$\pi_1 = \pi_2 = \frac{\mu}{2}$$

Admission of a small market team into the league would not be profitable for the two large market teams. Spending on talent for the large market teams and the small market team becomes

$$t_1^* = t_2^* = \frac{2\mu^2}{(\mu+2)^2}$$

$$t_3^* = \frac{2\mu(2-\mu)}{(\mu+2)^2}$$

Team profit is now

$$\pi_1 = \pi_2 = \frac{\mu^3}{(\mu+2)^2}$$

$$\pi_3 = \frac{(\mu-2)^2}{(\mu+2)^2}$$

The addition of the third team reduces the profit of each incumbent by an amount equal to

$$\frac{\mu(3\mu^2 - 4\mu - 4)}{(\mu+2)^2}$$

Aggregate profit falls by

$$\frac{3\mu^2 - 8\mu + 4}{2(\mu + 2)}$$

In this model entry will only occur if the existing teams can obtain a fee large enough to compensate them for their lost profit.

Since large market teams will not voluntarily expand the league, it is more conceivable that large and small market teams form competing leagues. One league will be made up of all large market teams and the other will be made up of all small market teams. Assuming that teams 1 and 2 are large market teams and teams 3 and 4 are small market teams, every period teams face the same problem. Expected profit can be written as

$$E(\pi_1) = \frac{t_1}{t_1 + t_2}\mu - t_1$$

$$E(\pi_3) = \frac{t_3}{t_3 + t_4}\lambda - t_3$$

The drawing power of large market teams is μ and is assumed to be greater than 1. The drawing power of small market teams is λ and is less than 1. The profit maximizing investment in talent and expected profit each period is

$$t_1^* = t_2^* = \frac{\mu}{4}$$

$$\pi_1 = \pi_2 = \frac{\mu}{4}$$

$$t_3^* = t_4^* = \frac{\lambda}{4}$$

$$\pi_3 = \pi_4 = \frac{\lambda}{4}$$

If the model is generalized to n-teams per league the profit maximizing investment in talent and expected profit become

$$t_1^* = \frac{n-1}{n^2}\mu$$

$$\pi_1 = \frac{1}{n^2}\mu$$

$$t_3^* = \frac{n-1}{n^2}\lambda$$

$$\pi_3 = \frac{1}{n^2}\lambda$$

Results

Figures 1 and 2 show the values of team effort and team profit for both top division and bottom division teams in an open league. Since teams in the top division have a higher drawing power it is no surprise that top division teams spend more on player talent than bottom division teams and also have higher profits. As the number of teams in the top division increases, the incentive to invest in player talent decreases and the probability of winning the championship decreases. In Figure 1, top division teams spend an average of 1079% more on player talent than teams in the bottom division.

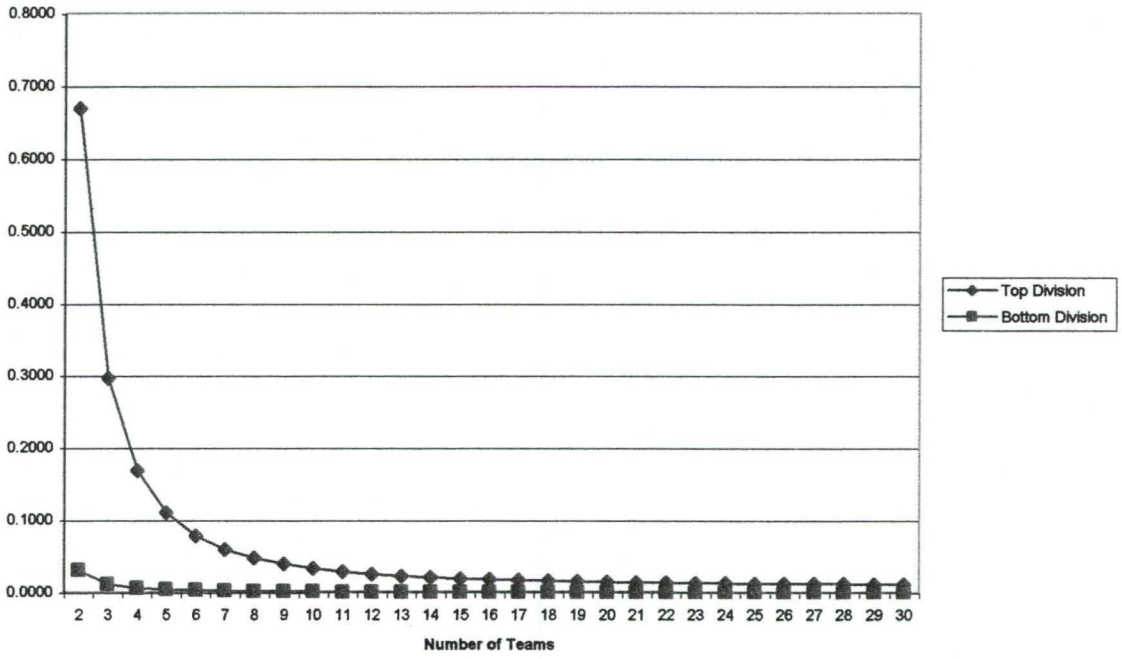

Figure 2. Open league team profit. Profit for teams in the top and bottom divisions holding constant λ=0.1, μ=1.2, δ=0.1 and k=2 as the number of teams in each division increases.

Figures 3 and 4 graph spending on player talent and team profit for μ=1.01 and λ=0.9. In Figure 3, top division teams still spend about 12.2% more on player talent than bottom division teams even though the drawing power of the top division teams is close to the drawing power of the bottom division teams.

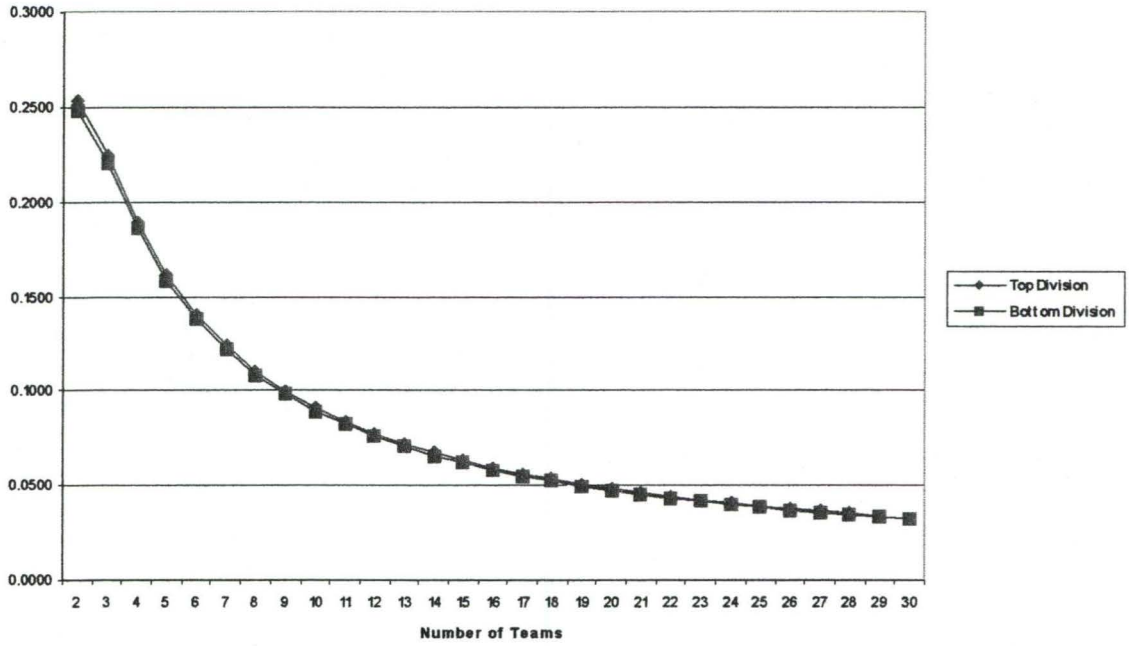

Figure 3. Open league team spending on player talent. Team spending in the top and bottom divisions holding constant λ=0.9, μ=1.01, δ=0.1 and k=2 as the number of teams in each division increases.

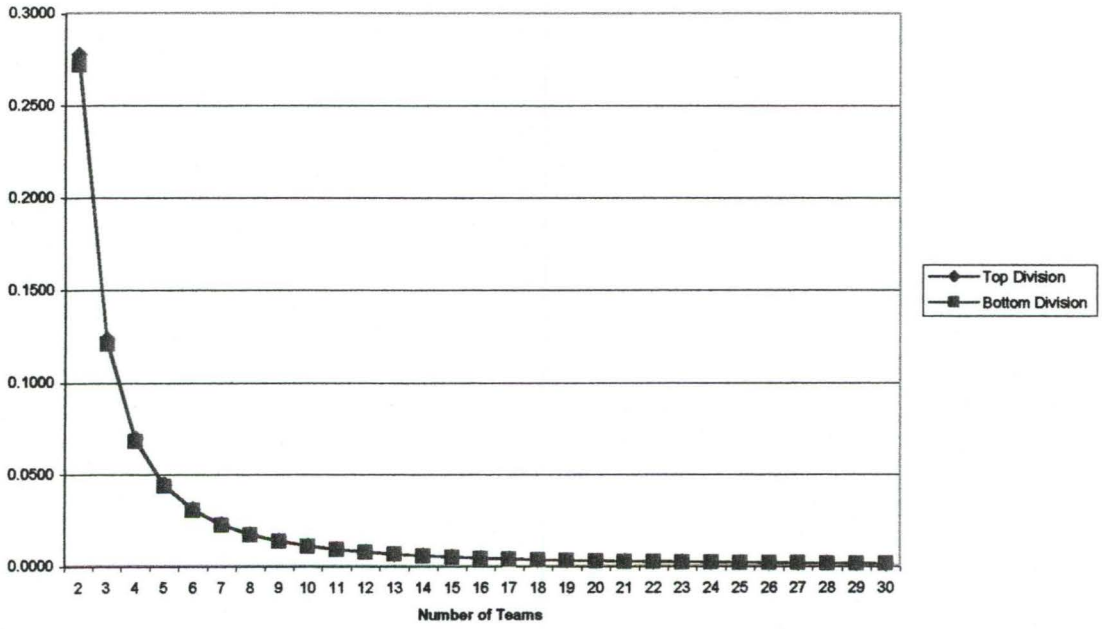

Figure 4. Open league team profit. Profit for teams in the top and bottom divisions holding constant λ=0.9, μ=1.01, δ=0.1 and k=2 as the number of teams in each division increases.

Figures 5 and 6 compare the effects of changes in drawing power of large market teams, μ, on investing in player talent for top division and bottom division teams. As μ increases teams have the incentive to increase their investment in player talent. Winning and playing in the top division is now more valuable so teams would be willing to spend more. The same is true for bottom division teams. As μ increases, the value of being promoted and competing in the top division increases so bottom division teams spend more on player talent.

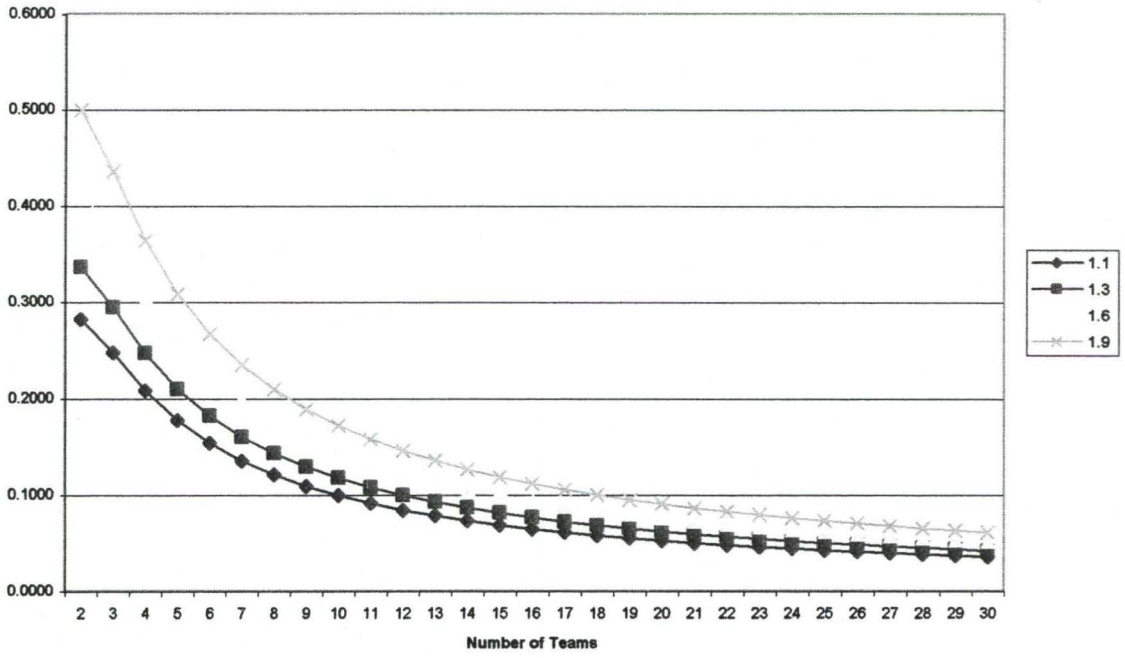

Figure 5. Spending by teams in the top division. Changes in spending by teams in the top division for different values of μ and n, holding constant λ=0.1, δ=0.1 and k=2.

As shown in Figure 5, top division teams spend about 18.2% more on player talent as μ increases from 1.1 to 1.3. As μ increases from 1.3 to 1.6 teams spend an average of 23.2% more and spending increases another 18.8% as μ increases from 1.6 to 1.9. Teams in the bottom division increase spending by 2.3% as μ increases from 1.1 to 1.3. When spending increases 10.2% as μ increases from 1.3 to 1.6 and 14.9% as μ increases from 1.6 to 1.9.

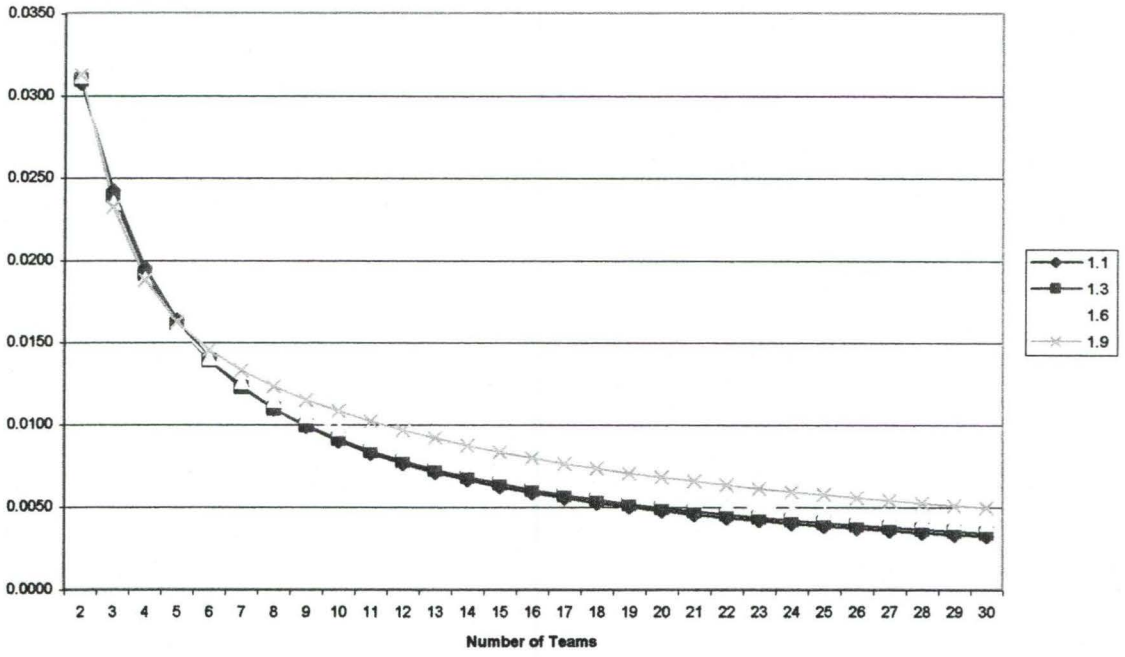

Figure 6. Spending by teams in the bottom division. Changes in spending by teams in the bottom division for different values of μ and n, holding constant λ=0.1, δ=0.1 and k=2.

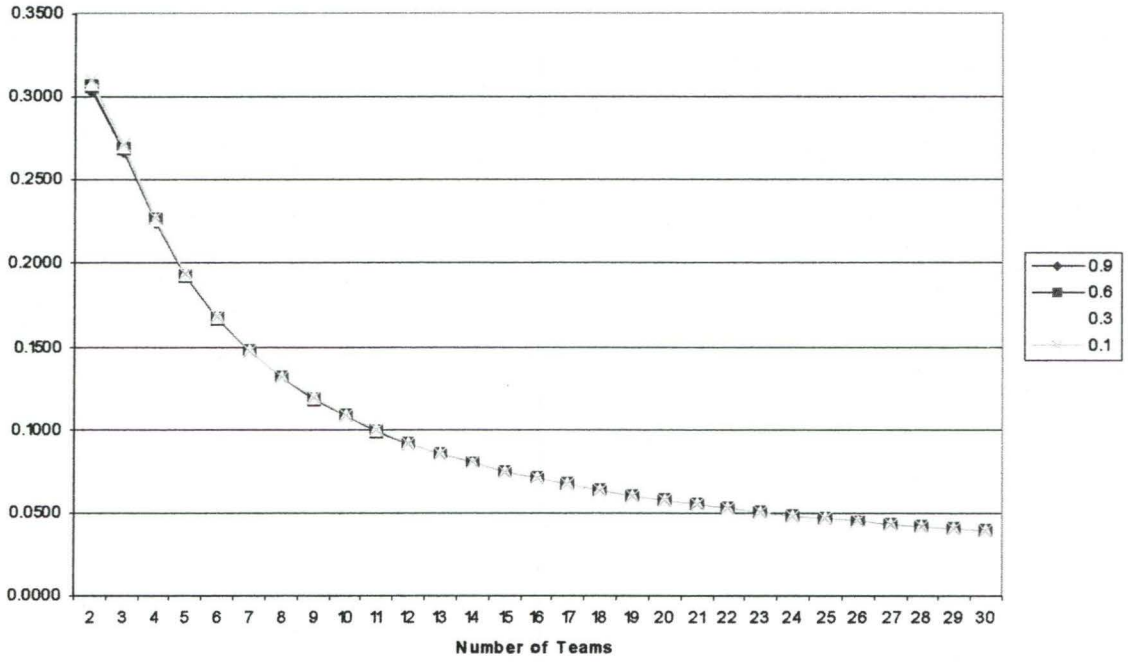

Figure 7. Spending by teams in the top division. Changes in spending by teams in the top division for different values of λ and n, holding constant μ=1.2, δ=0.1 and k=2.

Spending for top division and bottom division teams is presented in Figures 7 and 8. A change in the drawing power of bottom division teams will change the incentive for teams to invest in player talent. Teams in the bottom division have higher revenue as λ increases so they are willing to spend more. As λ increases from 0.1 to 0.3, bottom division teams increase spending by 195%.

An increase in λ from 0.3 to 0.6 increases spending by 99% and an increase in λ to 0.9 increases spending by 49%. Changes in λ have little impact on the spending behavior of teams in the top division, but spending decreases as λ increases, reflecting the decreased expected cost of relegation. On average

spending by top division teams decreases by 0.14% for each increase in λ. The loss of revenue due to relegation is less as the drawing power of bottom division teams increases.

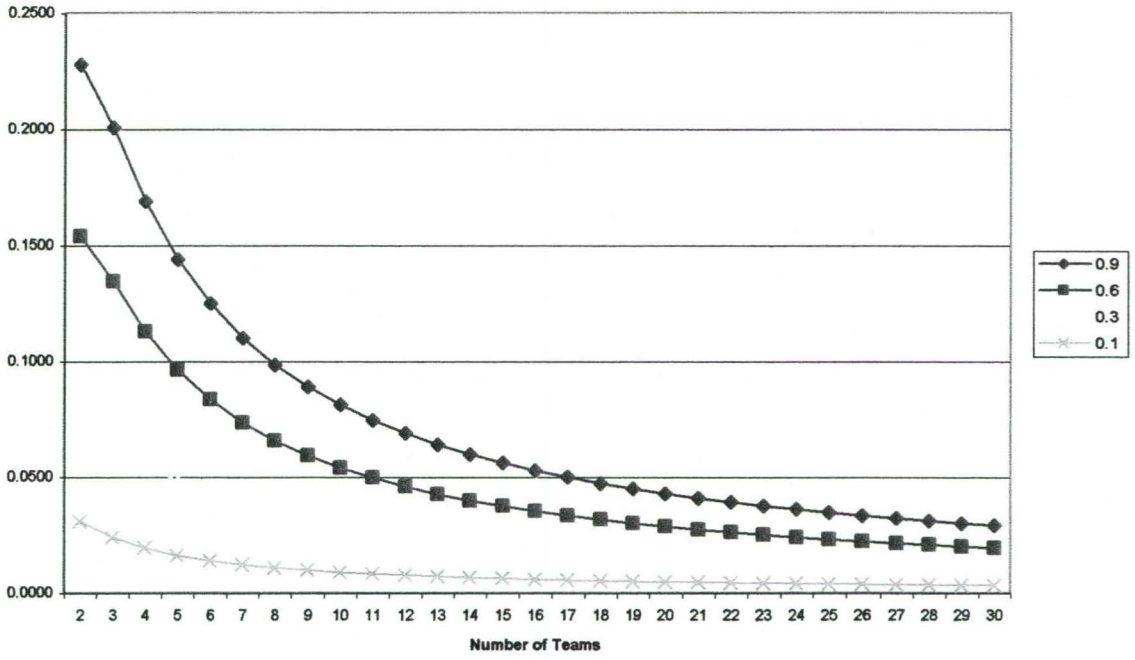

Figure 8. Spending by teams in the bottom division. Changes in spending by teams in the bottom division for different values of λ and n, holding constant μ=1.2, δ=0.1 and k=2.

As these results suggest, the elasticity of team spending on player talent with respect to team drawing power is 1. Although the effects of changes in drawing power on team spending in closed leagues are not presented, it is worth noting that the elasticity there is also 1.

Figures 9 and 10 graph team spending and team profit for top division teams as the number of teams that are promoted and relegated increases. Top

division teams will increase their spending on player talent in order to avoid relegation. As spending increases, profits will decrease.

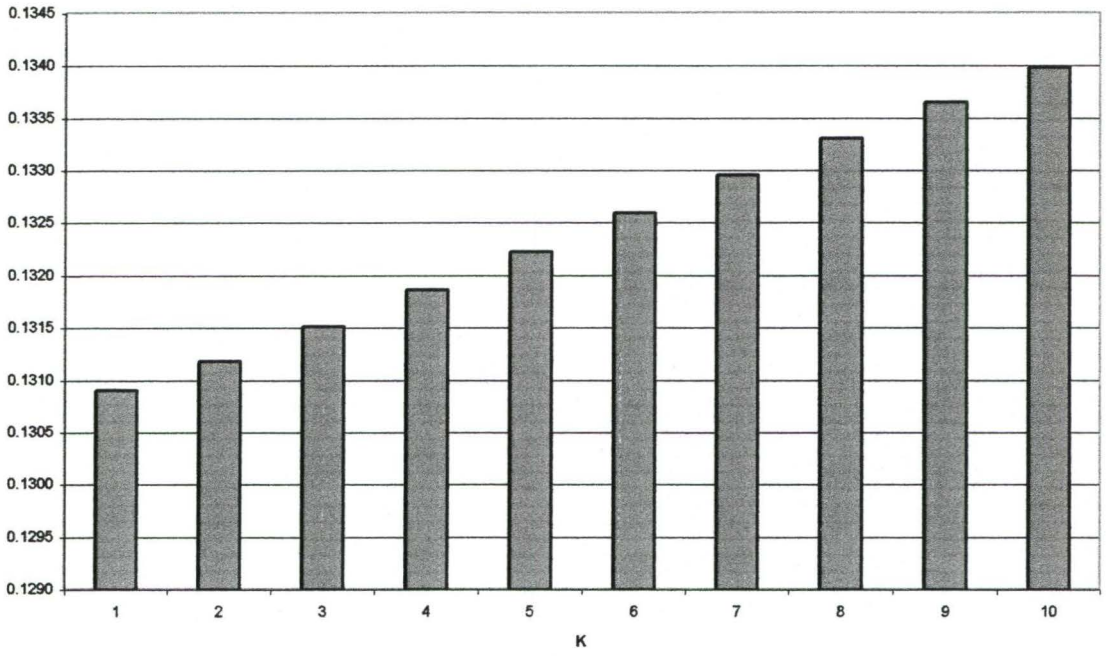

Figure 9. Changes in spending by teams in the top division. Changes in spending by teams in the top division for different values of k, holding constant μ=1.2, λ=0.1, δ=0.1 and n=20.

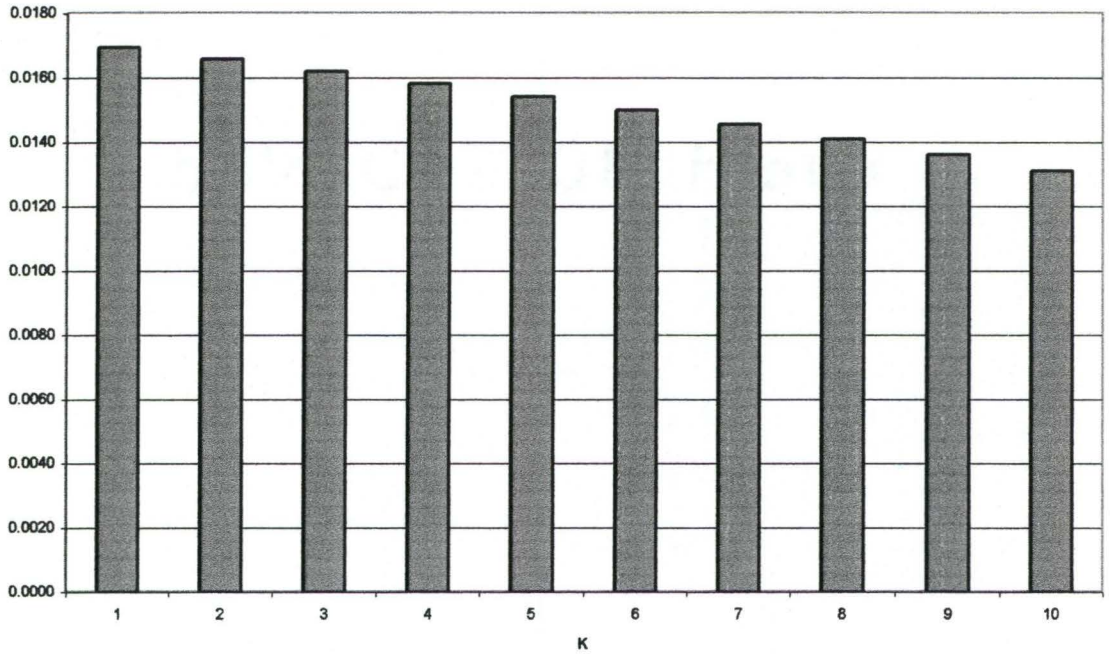

Figure 10. Changes in profit for teams in the top division. Changes in profit for teams in the top division for different values of k, holding constant μ=1.2, λ=0.1, δ=0.1 and n=20.

Increasing the number of teams that are promoted and relegated has the opposite impact on teams in the bottom division. As k increases, the probability of promotion increases so teams in the bottom division decrease spending on player talent. As spending on player talent decreases, team profits increase. Figure 11 graphs team spending of bottom division teams as k increases, and figure 12 graphs team profit as k increases. Changing the number of teams that are promoted and relegated has little impact on aggregate spending in the league. As k increases, teams in the top division have the incentive to increase spending on player talent since the probability of relegation increases. But the model predicts that spending by these teams will increase by less than 1%.

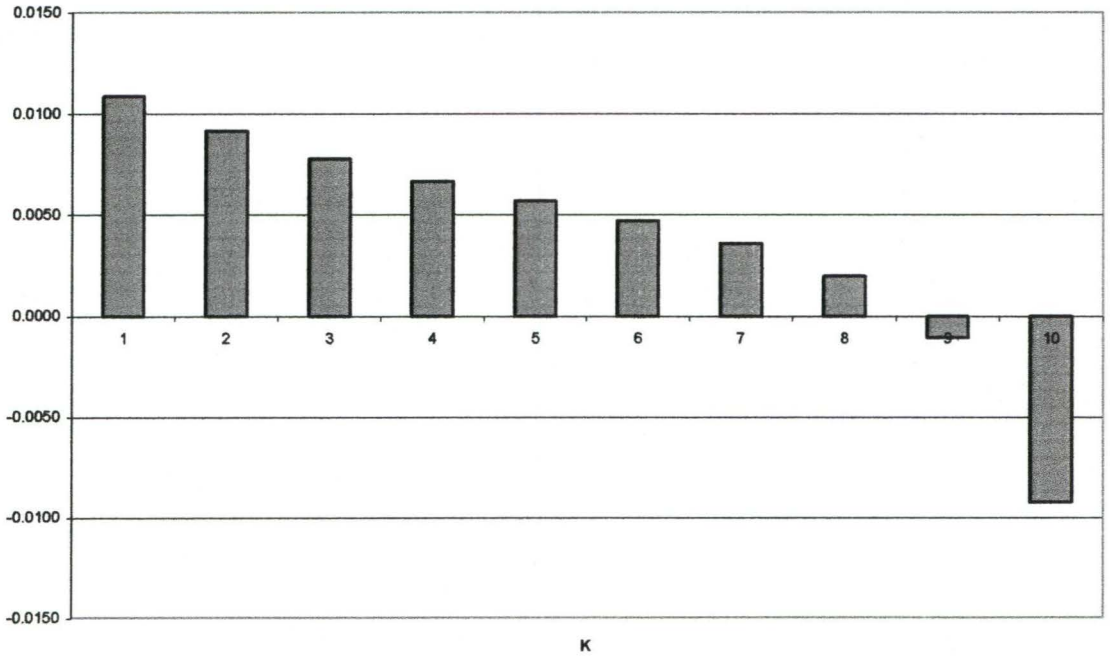

Figure 11. Changes in spending by teams in the bottom division. Changes in spending by teams in the bottom division for different values of k holding constant μ=1.2, λ=0.1, δ=0.1 and n=20.

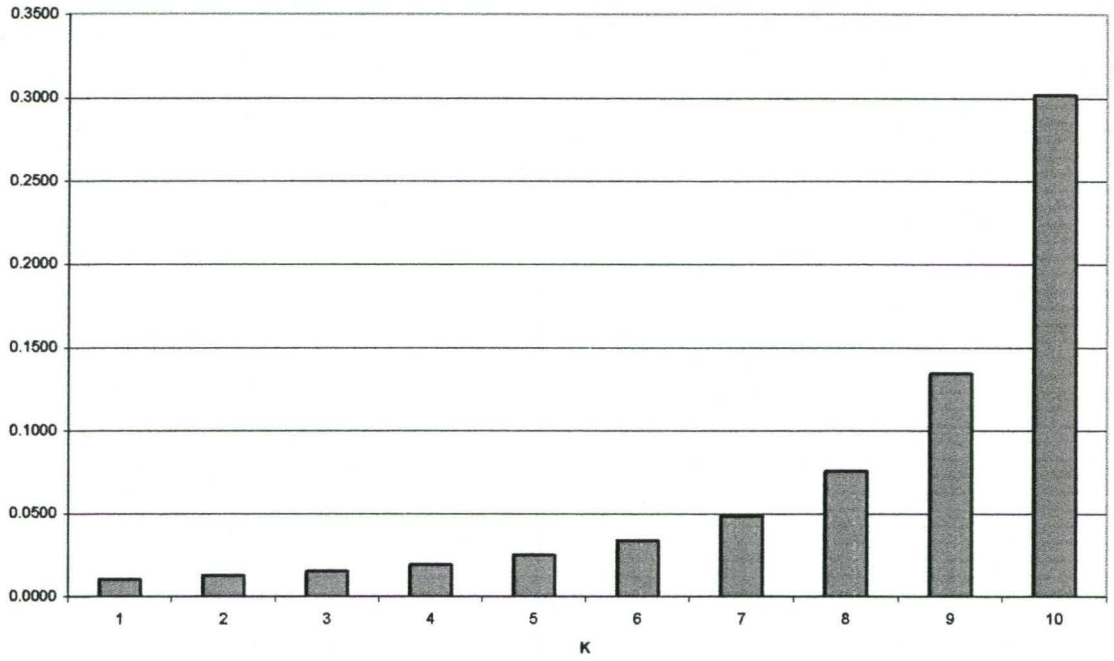

Figure 12. Changes in profit for teams in the bottom division. Changes in profit for teams in the bottom division for different values of k holding constant μ=1.2, λ=0.1, δ=0.1 and n=20.

Figures 13 and 14 compare team spending and team profit in both open and closed leagues. In general, top division teams spend more on player talent than large market teams in a closed league. The threat of relegation gives teams in the top division an additional incentive to invest in higher quality players than teams in closed leagues. Recall that relegation means playing in the bottom division with lower revenue generating potential. Large market teams in a closed league do not have to worry about relegation when they make decisions on how much to spend on player talent.

Teams that compete in the bottom division of an open league will spend more than small market teams in a closed league because of the prospect of

promotion. Teams in the bottom division spend more for two reasons. The first is that teams seek promotion because the top division has higher revenue generating potential than the bottom division. The second reason teams seek promotion is that the prize or championship can only be won by teams in the top division. Promotion and relegation give teams an added incentive to spend more on player talent than teams in a closed league. This suggests that the overall quality of play will be higher in an open league than in a closed league and fan utility will be higher. To investigate this aggregate spending in both leagues was reviewed.

The model ignores competition between leagues such as Major League Soccer in the United States and the Premier League in England. In general as the difference in drawing power between top division and bottom division teams increases, open leagues will produce a higher level of aggregate spending. As the difference in drawing power decreases, closed leagues will produce higher aggregate spending. These results are similar to the results of the symmetric model in Szymanski and Valletti (2002). The difference in aggregate spending between the open league and the closed league does not change as k increases from 2 to 3. The average difference in spending between the leagues is 1.8%.

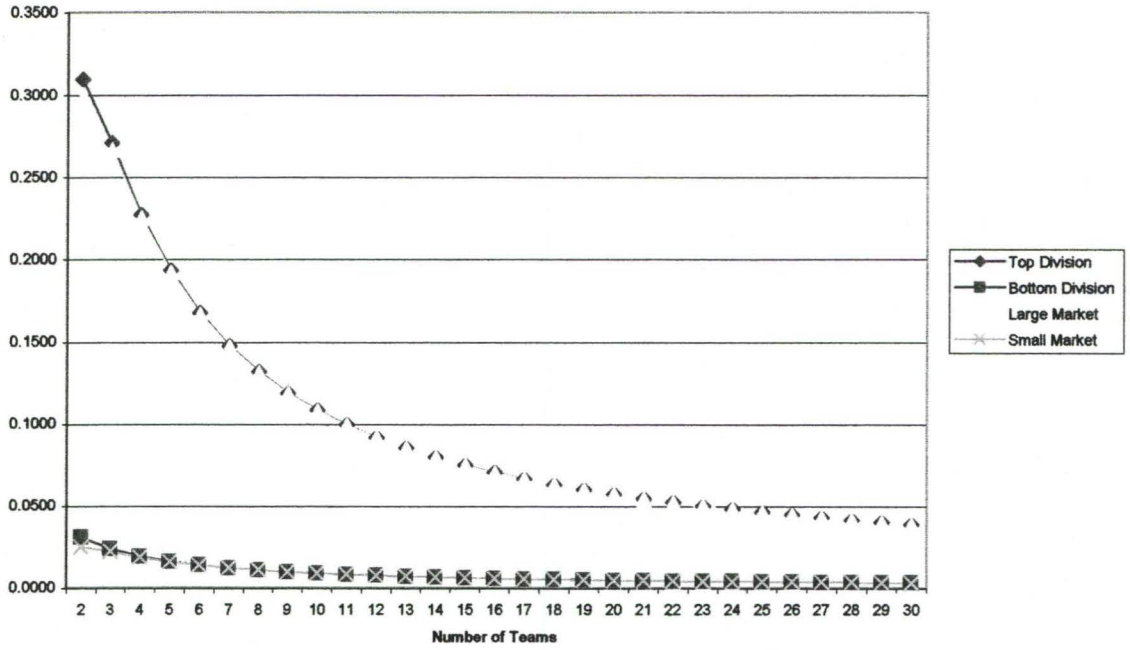

Figure 13. Team spending in open and closed leagues. Changes in team spending in open and closed leagues for different values of n, holding constant values of μ=1.2, λ=0.1, δ=0.1 and k=2.

A major change occurred in England's football league in the late 1980's and the early 1990's. The top division, later named the Premier League, shrunk from 24 to 20 teams between 1986 and 1988. The Premier League returned to 22 teams during the 1991-1992 season and then back to 20 teams in the 1995-1996 season. Dominant teams in the Premier League were apparently unhappy and in 1992 the Premier League broke away from the Football League, but still participated in the promotion and relegation scheme with the lower divisions. The model predicts an increase in spending on player talent by teams in the top division and an increase in team profit.

As the number of teams in the top division decreases, the probability of relegation increases so teams will spend more on player talent. Team profit also increases as the number of teams in the division decrease. This can be seen in Figure 14. The teams that were relegated out of the top division are placed into the bottom division. The model predicts that spending on player talent in the bottom division will fall since the probability of promotion is lower. Aggregate spending and aggregate profit for the league decreases as shown in Figures 15, 16, 17, and 18.

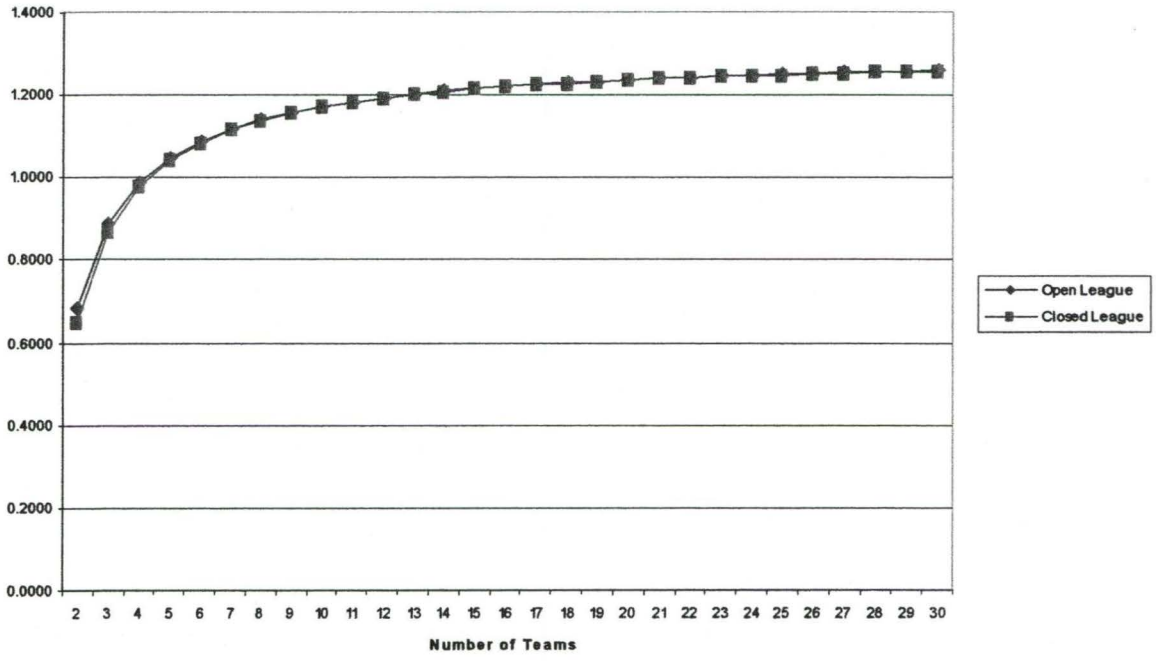

Figure 14. Changes in aggregate league spending in open and closed leagues for different values of n, holding constant μ=1.2, λ=0.1, δ=0.1 and k=2.

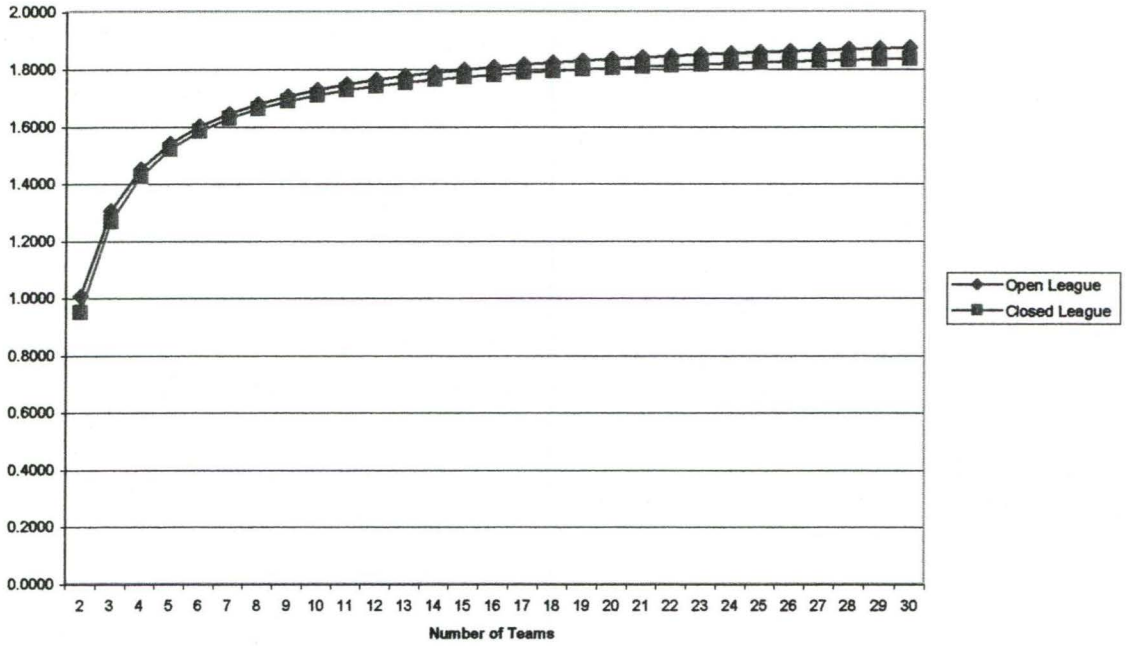

Figure 15. Changes in aggregate league spending in open and closed leagues for different values of n, holding constant μ=1.8, λ=0.1, δ=0.1 and k=2.

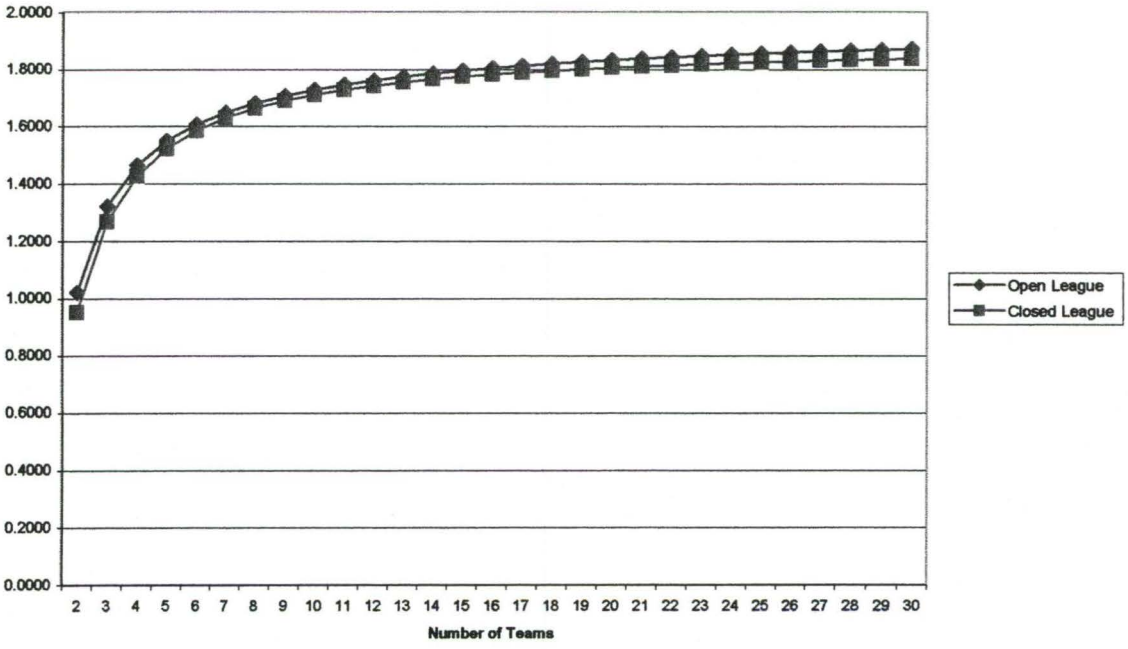

Figure 16. Changes in aggregate spending in open and closed leagues for different values of n, holding constant μ=1.8, λ=0.1, δ=0.1 and k=3.

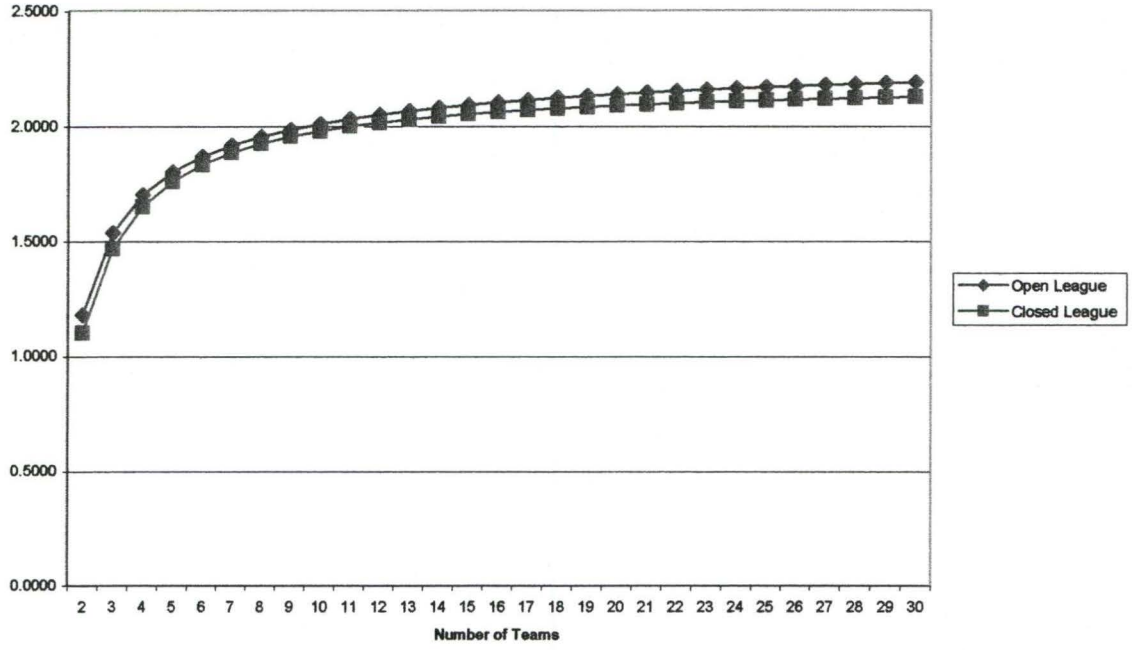

Figure 17. Changes in aggregate league spending in open and closed leagues for different values of n, holding constant μ=2.1, λ=0.1, δ=0.1 and k=3.

The model makes no clear predictions about competitive balance. Large market teams will tend to dominate the league because they generate more revenue to spend on quality players. This is a standard result Fort (2003). Although small market teams get promoted to the top division, their stay is typically brief. These teams do not generate enough revenue to compete in the top division and are, therefore relegated soon after. Even this brief stay in the top division may be beneficial to smaller market teams. Noll (2002) finds that on average, promotion into the Premier League is accompanied by an increase in attendance of 6,000 people per game. The benefits of promotion seem to last for a while after the team has been relegated to the lower division. This gives marginal

teams the incentive to pursue a strategy of bouncing back and forth between the top division and the lower division.

The issue of competitive balance is often used as an excuse for the restrictive practices of North American sports leagues. Teams in North America argue that in order to keep or promote competitive balance they must impose things like salary caps, luxury taxes, and revenue sharing. An extension of this framework to these issues would be a worthwhile undertaking.

Conclusion

This researcher extends the models found in Szymanski and Ross (2000) and Szymanski and Valletti (2002) and generates new results. In particular, this essay finds that sports leagues that practice promotion and relegation will have unambiguously higher aggregate spending on player talent than closed sports leagues.

Promotion and relegation add an additional dimension to league play that is not present in closed leagues. Openness eliminates meaningless games that are present in North American sports. In order to avoid relegation, teams must play at the highest level all season long. Competition among top division teams to avoid relegation produces more spending on player talent than large market teams in a closed league. Teams in lower divisions will spend more on player talent than small market teams in a closed league since the prospect of promotion means higher expected profit. Higher spending on player talent at each hierarchical level means that the overall quality of play will be higher in an open league. If fans derive utility from the quality of on-field play, fans of open leagues will have

higher utility than fans of closed leagues. These results are further enhanced by consideration of international competition between systems of leagues.

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THE IMPACT OF A PROFESSIONAL SPORTS FRANCHISE ON COUNTY EMPLOYMENT

Introduction

The controversy whether to subsidize professional sports teams and their facilities seems to have no end. All across the United States politicians are singing the praises of sports as a tool for economic development. Voters in the city of Arlington, Texas recently approved the funding for a new stadium for the Dallas Cowboys. City officials claim that the new stadium will bring in 2,000 new jobs and $2.9 million in city revenue. Officials in New York recently proposed spending over $2 billion on a new stadium as part of a failed bid to win the 2012 Olympics and to lure the Jets away from New Jersey. The project fell apart when a state committee rejected funding for the stadium.

The Supreme Court recently accepted the politicians' dubious claim of "economic development" in the controversial Kelo decision. The Court ruled that New London, Connecticut had the authority to take homes for a private development project. In order for the Arlington project to go forward, several pieces of property need to be transferred to the city. Litigation and legislation have been triggered by the Kelo case. Many states are rushing to limit the power of local governments to use eminent domain for economic development projects.

Stadium advocates argue that there are several benefits to having a major league team in the city and that building the stadium is more of an investment rather than wasteful government spending. The claimed payoff to this investment is an increase in

employment growth, an increase in government revenue and an increase in the quality of life in the city. The benefits can be categorized into three types: direct benefits, indirect benefits and intangible benefits.

Direct Benefits

Direct benefits are the benefits derived from the construction of the new stadium or the renovation of an existing facility. Stadium advocates claim construction spending increases employment and adds to the overall economy through economic multipliers. The overall impact of the one time increase in construction spending could be small. Construction spending represents a one-time increase in expenditures and, depending on the size of the project, the impact could be small and short lived. There is also the question of whether or not the new construction defers other planned construction. If this is the case, the new spending will have little impact on the local economy. Other direct benefits include rent paid by the tenants, spending on concessions, parking fees, advertising and ticket sales. There are several potential flaws in the use of economic multipliers. There is the question of how much of the direct spending stays in the local economy and that most of the jobs created through the direct benefits will be part-time or temporary jobs, so the impact on the overall economy in the county will be negligible.

Indirect Benefits

Sports facilities also benefit the local economy through indirect spending in sports related industries. Impact studies claim that spending on hotels, restaurants, bars and retail stores will increase because of they are complements to the sports industry. Visitors who attend games will spend money in sports related industries. The increase in demand in these industries will result in an increase in employment and an increase in the

incomes of those employed in these industries. There have been several academic studies that attempt to measure this impact. Most of these studies fail to find any significant impact from the presence of sports teams on the local economy. Baade and Dye (1990) look at the level of retail sales and aggregate income in nine metropolitan statistical areas (MSAs) between 1965 and 1983. Baade and Dye (1990) found that there is an insignificant impact of a stadium on the level of MSA income. In four of the nine MSAs, the impact of a stadium had a negative effect on income. The researchers also fail to find any significant relationship between the presence of a sports stadium and retail sales. Baade (1996) uses a sample of forty-eight cities between 1958 and 1987 to look at employment in the amusements and recreation and commercial sports industries. Baade (1996) failed to find a positive correlation between professional sports and job creation. Using a similar approach, Baade and Sanderson (1997) look at employment in ten MSAs between 1958 and 1993. Using data on the amusement and recreation and commercial sports industries, they find nine cities where there was a significant impact from the presence of a professional sports team. Of the nine statistically significant results five were positive and four were negative.

Coates and Humphreys (2003) studied the impact of sports franchises on employment and earnings in thirty-seven MSAs between 1969 and 1996. They found some evidence that the presence of a sports franchise had a negative impact on employment in both the retail and services sectors, but only the services sector coefficient was significant. They estimated that the mean impact would be a loss of 1022 jobs in the retail sector. Coates and Humphreys (2003) also estimated the impact of sports on earnings in the eating and drinking, amusements and recreation and hotels and lodging

sectors. Earnings fell by $162 per worker in the eating and drinking sector and earnings increased by $10 in the hotel and lodging sector. Earnings in the amusements and recreation sector increased by $490, but this sector included the salaries of professional athletes. Coates and Humphreys (1999) researched real per capita income in 37 MSA's between 1969 and 1994. They found evidence that the presence of a sports franchise reduced the level of real per capita income, but had no impact on the growth rate of real per capita income in their sample.

Intangible Benefits

Intangible benefits can be defined as the benefits to the local economy of being labeled a major league city. Politicians and stadium advocates often argue that being a major league city will help attract new industries and business to the local area. This implies that companies not related to the sports industry want to be in a city that hosts a major league team. Baade and Dye (1988) tested this by looking at three measures of manufacturing activity: manufacturing employment, manufacturing value added and new capital expenditures in eight MSAs between 1965 and 1978. They found little support of any link between major league sports and manufacturing activity. Carlino and Coulson (2004) estimated the willingness to pay for an NFL franchise by looking at rental rates and wages in cities. Their hypothesis was that sports fans are willing to pay for a team by accepting lower wages and paying higher rental rates. Based on their results they concluded that in order to retain an NFL franchise, some subsidies may be justified in large cities.

Data

This section is a discussion of the data used in the analysis. The data cover the period 1993 to 2002. Employment statistics were taken from the County Business Pattern dataset, which is produced by the US Census Bureau. The data used in this study represents an important extension to the existing literature. The previous literature used MSA level data, while this study uses more detailed county level data. This study also uses more detailed 3 and 4-digit SIC employment data rather than 2-digit major industry code data. By narrowing the geographic region of interest, it is anticipated that some impact from the presence of a sports franchise, should it exist, can be more readily detected.

Sports related spending represents a small fraction of total spending in an MSA, so it should be no surprise that the previous literature found no correlation between the presence of a sports franchise and employment growth. The use of 3 and 4-digit SIC employment data helps to refine the analysis in this paper as well. The 2-digit major industry codes include many non-sports related industries. If sports related spending is only a small fraction of total county spending, using employment data from 2-digit industry codes may not pick up changes in employment related to a sports franchise. The industries used in this study are industries that are often citied as beneficiaries to sports stadiums.

The apparel and accessory store industry is said to benefit because of an increase in foot traffic of visitors of stadium events. Fans of the local sports teams will also purchase sports related memorabilia from local stores. The additional spending at these stores will increase retail employment. Employment in eating and drinking places may

also increase due to a new sports team. The argument is that fans that frequent the stadium will also spend money at local restaurants and bars. In addition to the stadium traffic, fans not seeking to attend games live will seek out bars and restaurants to watch the events on live television.

Several industries are said to benefit from an increase in tourism due to the new sports team. Automobile rentals, gas stations and hotels will all benefit from fans that travel from far away to attend events at the sports stadium. (See Table 10.) If the claims made in economic impact studies are correct, then we should be able to observe an increase in employment in these industries after a new NFL franchise moves into the area.

Table 10. Industries in Dataset

Apparel and accessory stores	Eating places
Drinking places	Liquor stores
Hotels and other lodging	Automobile rentals
Gasoline service stations	

Lists of counties that are used in this study along with summary statistics of the employment data are provided in Appendix B. The purpose of this study is to investigate the impact of an NFL franchise on county employment. There are a total of 43 counties in the dataset. Thirty-three counties had an NFL franchise at some point during the sample period.

Models

This paper uses two different econometric specifications. The first model is similar to that found in Baade (1996) and Baade and Sanderson (1997). It estimates the impact of sports using ratios of county to state data. The following equation is used to estimate jobs created by sports teams:

$$\frac{CEmp_{i,t}}{SEmp_{j,t}} = \beta_0 + \beta_1 \frac{CInc_{i,t}}{SInc_{j,t}} + \beta_2 \frac{CPop_{i,t}}{SPop_{j,t}} + \beta_3 NFL_{i,t} + \beta_4 MLB_{i,t} + \beta_5 NBA_{i,t} + \beta_6 Cnty_i + \varepsilon_{i,t}$$

where $CEmp_{i,t} / SEmp_{j,t}$ = county i's share of state employment in one of the industries listed in Table 10 at time t, $CInc_{i,t} / SInc_{j,t}$ is the ratio of county i's real per capita income to the state j's per capita income at time t, $CPop_{i,t} / SPop_{j,t}$ is the ratio of county i's population to state j's population at time t, *NFL* is a dummy variable with a value of 1 for the presence of a NFL team at time t and 0 otherwise, *MLB* is a dummy variable with a value of 1 for the presence of a MLB team at time t and 0 otherwise, *NBA* is a dummy variable with a value of 1 for the presence of a NBA team at time t and 0 otherwise, *Cnty* is a fixed effect county dummy variable, and ε is the error term.

The purpose of this model is to capture any change in county employment relative to changes in state employment. If county employment increases due to the presence of an NFL franchise, then the ratio of county to state employment should increase after an NFL team moves in to the area. If there is a negative impact on county employment, the ratio of county to state employment will decrease when a team moves into the area.

Coates and Humphreys (2003) criticize this model because the employment share in a county (i) can go up or down as a consequence of changes in employment in county

(j). Suppose the level of employment in county (j) increases, while the level of employment in county (i) does not. At the same time, a new NFL stadium is built in county (i). The result would be that county (j)'s share of state employment would increase and county (i)'s share would decrease. This would give us the result that the NFL stadium had a negative impact on employment in county (i) when in fact employment has not changed at all. With this problem in mind, this researcher used a second specification adopted from Coates and Humphreys (1999). They used an event study model similar to that found in the finance literature. The model used in this study is:

$$CE_{i,t} = \beta_0 + \beta_1 \overline{CE_t} + NFL_{i,t} + MLB_{i,t} + NBA_{i,t} + county_i + \varepsilon_{i,t}$$

where $CE_{i,t}$ is the level of county (i)'s employment at time t in an industry, $\overline{CE_t}$ is the average county employment in an industry at time t, NFL is a dummy variable with a value of 1 for the presence of a NFL team at time t and 0 otherwise, MLB is a dummy variable with a value of 1 for the presence of a MLB team at time t and 0 otherwise, NBA is a dummy variable with a value of 1 for the presence of a NBA team at time t and 0 otherwise, $Cnty$ is a fixed effect county dummy variable, and ε is the error term.

For both models, the Hausman specification test concluded that a fixed effect model was preferred over a random effects model. The results of the test are not provided. Additional tests determined that the data suffered from first order serial correlation. Stata software includes commands that correct for serial correlation using the Cochrane-Orcutt procedure.

Results

Table 11 reports the estimated coefficients for the sports dummy variables using the Baade model. Complete regression results are presented in Appendix C. In both cases, county and year dummy variables are not reported. None of the sports dummy variables come out significant suggesting that there is no correlation between the presence of a professional sports franchise and employment in any of the included industries. This result, although consistent with previous academic literature, may be surprising to stadium advocates. The included industries are those industries that stadium advocates claim will benefit from the presence of a sports franchise.

Table 11. Estimated Sports Coefficients from the Baade Model

	Dependant Variable							
Variable	Aggregate	Gas Station	Apparel	Eating Places	Drinking Places	Liquor Stores	Hotel	Car Rental
NFL	-0.00114	-0.00914	-0.00271	-0.00039	-0.03271	0.01071	0.00417	-0.02626
	(-1.08)	(-0.8)	(-0.2)	(-0.04)	(-1.09)	(0.62)	(0.23)	(-0.18)
NBA	0.00216	0.01093	-0.00138	0.0094	0.02423	0.0768	0.04362	0.34891
	(0.84)	(0.4)	(-0.04)	(0.4)	(0.34)	(1.94)	(0.98)	(0.57)
MLB	0.0004	0.02935	-0.00623	-0.01607	-0.02527	-0.00194	-0.00621	-0.11296
	(0.11)	(0.96)	(-0.13)	(-0.51)	(-0.26)	(-0.04)	(-0.1)	(-0.26)

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$
t-statistics in parentheses

The results from the Baade regression (Appendix C) are supported by the results of the regression using the model from Coates and Humphreys (Appendix D). The only significant coefficient comes from the regression using drinking employment data. The coefficient for the NFL comes out negative. The estimate represents a loss of 159 jobs in the drinking places industry when a new NFL team moves into the county.

Table 12. Estimated Sports Coefficients from Coates and Humphreys Model.

Dependent Variable								
Variable	Aggregate	Apparel	Eating Places	Drinking Places	Liquor Stores	Hotel	Car Rental	Gas Stations
NFL	-10738.3	244.4053	628.5591	-159.276*	-14.7611	-39.7479	-50.8261	-90.7858
	(-1.66)	(1.08)	(1.29)	(-2.18)	(-0.62)	(-0.09)	(-0.64)	(-0.98)
MLB	3488.562	-748.669	-271.99	-83.9521	-2.3844	-1114.99	141.8974	826.0161
	(0.15)	(-0.93)	(-0.15)	(-0.34)	(-0.03)	(-0.7)	(0.61)	(2.56)
NBA	17602.31	285.1612	1225.557	223.9972	79.1036	587.1191	208.1754	84.94303
	(1.05)	(0.5)	(0.97)	(1.27)	(1.45)	(0.52)	(0.63)	(0.37)

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$
t-statistics in parentheses

Although the coefficients for all the sports dummy variables came out insignificant, it is appropriate to give some estimate of the change in employment due to the addition or elimination of an NFL team in some counties. Table 13 gives estimates of the change in aggregate county employment. All the counties that gained an NFL franchise during the sample period experienced a decrease in aggregate employment the first year the team

began play. Los Angeles, Harris and Cuyahoga Counties lost teams during the sample period. Each of these counties experienced an increase in aggregate employment after an NFL franchise moved away from the county. These estimates, although insignificant, cast doubt on the claims made by economic impact studies that sports stadiums are a catalyst for economic development and employment growth.

Table 13. Estimated Change in Aggregate County Employment from NFL Franchises

County	Year	Team Status	Change in Aggregate Employment
St. Louis	1995	Gained Team	-601
Mecklenburg	1995	Gained Team	-472
Los Angeles	1995	Lost Team	+3983
Harris	1997	Lost Team	+1723
Harris	2002	Gained Team	-1886
Duval	1995	Gained Team	-397
Davidson	1997	Gained Team	-432
Cuyahoga	1996	Lost Team	+821
Cuyahoga	1999	Gained Team	-863
Baltimore	1996	Gained Team	-340
Alameda	1995	Gained Team	-599

The results from the Coates and Humphreys model predict a loss of jobs with the addition of an NFL franchise and the addition of jobs with the loss of an NFL franchise. The magnitudes of the jobs lost or gained are less plausible. The results predict a loss of

10,738 jobs economy wide when a new NFL franchise enters the county. The loss of an NFL team would mean an additional 10,738 county jobs. These results seem too large to be believable, but the sign of the coefficient is the same as with the Baade model.

There are several possible explanations for the above results. One possible explanation is that the impact of a sports franchise is too small to capture using county level data. As stated earlier, most of the previous academic literature used MSA level data and failed to find any correlation between sports franchises and employment growth. It may be possible to find a relationship between employment growth and sports facilities by narrowing the geographic area if interest. It may be that businesses within a few blocks receive indirect benefits because fans do not travel far from a stadium on game day. Therefore the spending will not be spread out over the entire county or MSA and be limited to a small geographic area around the stadium.

Another possibility lies within the data itself. Employment data in the County Business Patterns is based on March payroll data. Since the NFL season has been completed for almost two months, the March payroll data may be missing the employment impact from the NFL. This may be true, but it supports the idea that the NFL does not create quality full-time employment. It may be that NFL franchises create only seasonal and part-time jobs. This criticism supports the idea that public funding for sports stadiums is not in the public interest and that there are few measurable economic benefits to the spending.

Conclusion

Public subsidies for professional sports stadiums are often used as a means to stimulate economic development in local communities. Economic impact studies claim

that stadiums will induce job creation and revenue expansion. Using data on metropolitan statistical areas, academics find little to support the claims that stadiums help create jobs and increase the income in the local economy. This paper adds to the current literature by using detailed county level data.

For jobs to be created, economic activity must shift towards the county when a new sports team moves into the area. The industries that benefit from direct and indirect spending should exhibit employment growth relative to the rest of the state due to sports related spending. The additional spending should also increase the increase county income relative to the rest of the state. The results in this paper fail to find any correlation between an NFL franchise and employment or income growth. If there is any correlation, it may be negative. The movement of a new NFL franchise into an area may cause a decrease in aggregate employment in a county. These results strengthen the claims against using public funding for sports stadiums as a tool for economic development.

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CONCLUSIONS

The three studies in this thesis explore several issues relating to open and closed sports leagues. The ability of a closed league to limit competition creates an artificial scarcity of teams. This scarcity enables the existing league members to extract economic rents in the form of public subsidies for stadiums. Politicians and team owners claim that the use of public funds is justified because the spending brings in hundreds, if not thousands, of jobs and millions of dollars in revenue to the local economy. Little evidence was found within this research to support these claims. Econometric analysis fails to show any correlation between the presence of a professional sports franchise and employment growth.

This research also shows that teams in an open league that practice promotion and relegation have a greater incentive to invest in player talent than teams in a close league. The promotion and relegation system gives teams in lower divisions the incentive to invest more on player talent because promotion to a higher division means greater revenue generating potential. Teams already in the upper divisions will increase spending on player talent to avoid being relegated to a lower division with lower revenue generating potential. These incentives are not present in a closed league; therefore, the overall spending and the overall quality of play will usually be higher in an open league than a closed league.

Some open leagues have strict entry restrictions. These restrictions come in the form of age requirements, appearance requirements and overall quality of play

requirements. While these restrictions increase the quality of play in the league, some seem to limit entry by new competitors.

APPENDICES

Appendix A

PGA Tour Event Priority Ranking

1.	Winners of PGA Championship or U.S. Open prior to 1970 or in the last 10 calendar years. (Beginning in 1998, this is a five-year exemption.):
2.	Winners of THE PLAYERS Championship in the last 10 calendar years. (Beginning in 1998, this is a five-year exemption.):
3.	Winners of the Masters Tournament in the last 10 calendar years. (Beginning in 1998, this is a five-year exemption.):
4.	Winners of the British Open in the last 10 calendar years. (Beginning in 1998, this is a five-year exemption.):
5.	Winners of the World Series of Golf from 1995 to 1997. (Ten-year exemption.):
6.	THE TOUR Championship winners in the last three years, beginning with the 2002 winner:
7.	Winners of official money World Golf Championship events in the last three years:
8.	The leader in PGA TOUR official earnings in each of the last five calendar years.
9.	Winners of PGA TOUR co-sponsored or approved events (except team events) within the last two calendar years, or during the current year; winners receive an additional year of exemption for each additional win, up to five years:
10.	A. Members of the last-named U.S. Presidents Cup Team: B. Members of the last-named International Presidents Cup Team provided they were a PGA TOUR member at the time they were named to the team: C. Members of the last-named U.S. Ryder Cup team provided they were a PGA TOUR member at the time they were named to the team: D. Members of the last-named European Ryder Cup Team:
11.	Leaders in official PGA TOUR career earnings, as follows: A. Players among the top 50 in career earnings as of the end of the preceding calendar year may elect to use a one-time, one-year exemption for the next year: B. Players among the Top 25 in career earnings as of the end of the preceding calendar year may elect to use this special exemption for a second year, provided that the player remains among the Top 25 on the career money list.
12.	Sponsor exemptions (a maximum of eight, which may include amateurs with scratch handicaps of 0 or less), on the following basis: A. Not less than two sponsor invitees shall be PGA TOUR members not otherwise exempt for the event. B. Not less than two of the top 30 finishers and ties from the last Qualifying Tournament, as well as 2-20 from the 2004 Nationwide Tour money list, if not all of them can otherwise be accommodated. (Note: PGA TOUR members may receive an unlimited number of sponsor invitations. Non-TOUR members may receive a maximum of seven per year).

Appendix A

PGA Tour Event Priority Ranking (Continued)

13.	Two international players designated by the Commissioner.
14.	The current PGA Club Professional Champion for a maximum of six open events (three must be from open tournaments held opposite the British Open and the World Golf Championships), in addition to any sponsor selections:
15.	PGA Section Champion or Player of the Year of the Section in which the tournament is played.
16.	Two members of the PGA Section in which the tournament is played, who qualify through sectional qualifying competitions.
17.	Four low scorers at Open Qualifying which shall normally be held on Monday of tournament week.
18.	Past champions of the particular event being contested that week, if cosponsored by the PGA TOUR and the same tournament sponsor (except for Team events), as follows: A. Winners prior to July 28, 1970: unlimited exemptions for such events. B. Winners after July 28, 1970 and prior to Jan. 1, 2000: 10 years of exemptions for such events. C. Winners after Jan. 1, 2000: five years of exemptions for such events.
19.	Life Members (who have been active members of the PGA TOUR for 15 years and have won at least 20 co-sponsored events):
20.	Top 125 on previous year's Official Money List -- If not exempt under "Special Exemptions," the top 125 PGA TOUR members on the previous year's Official Money List, in order of their position:
21.	Players who earned more than the 125th place finisher on 2004 PGA TOUR Money List as non-members:
22.	Major Medical Extension -- If granted by the Commissioner, if not otherwise eligible, and if needed to fill the field, Major Medical Extension:
23.	Leading Money Winner from 2004 Nationwide Tour:
24.	Top 10 and Ties among professionals from the previous open tournament whose victory has official status are exempt into the next open tournament whose victory has official status.
25.	Top 30 and Ties from the previous year's PGA TOUR Qualifying Tournament, in order of their finish, and players 2-20 on the 2004 Nationwide Tour money list:
26.	Players winning three Nationwide Tour events in the current year, in priority determined by the date they win their third event.
27.	Minor Medical Extension:
28.	Next 25 members after the Top 125 members from previous year's Official Money List. If needed to fill the field, the next 25 PGA TOUR members after the top 125 PGA TOUR members from the previous year's Official Money List, in order of their position on the list:

Appendix A

PGA Tour Event Priority Ranking (Continued)

29.	Non-Exempt, Major Medical Extension:
30.	Past Champions, Team Tournament Winners and Veteran Members Beyond 150 on Money List: If not otherwise eligible and as needed to fill the field, Past Champion members, Team Tournament Winners and Veteran members beyond 150th place on the previous year's Money List, in order of their combined official PGA TOUR and Nationwide Tour earnings in the previous year.
31.	Past Champion Members: If not otherwise eligible and if needed to fill the field, Past Champion members, in order of the total number of cosponsored or approved events won, excluding Team events. If two or more players are tied, the player who is higher on the PGA TOUR Career Money List shall be eligible.
32.	Special Temporary: If during the course of a PGA TOUR season, a nonmember of the PGA TOUR wins an amount of official money (e.g., by playing in PGA TOUR events through sponsor exemptions, Open Qualifying, etc.) equal to the amount won in the preceding year by the 150th finisher on the official money list, he will be eligible for the remainder of the year.
33.	Team Tournament Winners: If not otherwise eligible and if needed to fill the field, winners of co-sponsored team championships, in order of the total number of team championship tournaments won. If two or more players are tied based on the number of such tournaments won, the player who is higher on the official PGA TOUR Career Money List shall be eligible.
34.	Veteran Members: If not otherwise eligible and if needed to fill the field, Veteran members (players who have made a minimum of 150 cuts during their career), in order of their standing on the PGA TOUR Career Money List.

(PGA Tour, 2005)

Appendix B

Summary Statistics by County and Industry

Alameda CA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2389	5391	32436	963	576	4563	1927	584874
sd	97	699	2124	134	34	578	435	63486

Allegheny PA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	3313	7603	41913	2518	835	6160	1196	670109
sd	246	690	2544	160	72	1002	331	17769

Baltimore MD

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1612	5523	21389	755	913	1598	347	301877
sd	89	540	1208	162	69	264	146	11519

Bergen NJ

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1894	7618	19494	648	702	3321	1896	442913
sd	129	400	1600	54	47	110	609	23162

Bernalillo NM

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1461	2530	19837	1347	409	4173	728	241601
sd	248	443	1082	186	57	281	139	10978

Brown WI

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	944	979	7374	725	148	1481	155	119152
sd	130	86	842	170	12	163	18	11051

Appendix B

Summary Statistics by County and Industry (Continued)

Clark NV

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	3174	6635	34380	3580	232	147944	2319	534876
sd	870	2168	8351	850	39	16509	587	102680

Cobb GA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1471	3725	19495	368	223	2911	842	268879
sd	237	478	1214	107	19	648	240	38258

Cook IL

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	7609	29440	136529	7412	2817	26887	4091	2413834
sd	535	2198	7380	327	155	1339	426	85118

Cuyahoga OH

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	3476	8184	43059	2725	340	5713	1644	731206
sd	228	770	2031	210	48	442	166	33757

DC

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	740	3306	26259	1400	846	13918	287	408700
sd	125	121	1480	276	70	874	126	11056

Dallas TX

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	5155	11594	71173	4820	1297	21273	2985	1349681
sd	890	997	7671	558	150	1890	403	121514

Appendix B

Summary Statistics by County and Industry (Continued)

Davidson TN

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2130	4612	24883	573	311	8828	828	376234
sd	292	252	1472	204	19	1088	116	21204

Denver CO

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1353	2761	23302	2150	541	7110	1902	379162
sd	351	291	2869	275	47	641	373	23531

Duval FL

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2168	3630	22840	649	374	3071	1158	370789
sd	298	378	1344	119	30	333	292	30843

Erie NY

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2444	4504	27562	1913	549	3362	656	400623
sd	315	373	1251	118	58	321	96	8406

Fairfax VA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2144	6607	25370	246	237	5501	216	434316
sd	126	569	2515	90	43	436	44	67021

Fulton GA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2012	7293	40533	1808	737	14203	1685	666610
sd	111	1213	4529	152	32	1229	279	78092

Appendix B

Summary Statistics by County and Industry (Continued)

Hamilton OH

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2221	5639	34424	1950	294	4557	1131	528116
sd	370	397	1886	606	53	999	236	15328

Harris TX

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	6752	16119	93192	4928	725	14412	3080	1537759
sd	1969	1674	9759	719	91	662	349	116042

Hartford CT

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2089	5348	23150	827	709	2834	994	452644
sd	179	523	1729	98	46	92	112	23914

Hennepin MN

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	4144	8712	41939	2327	1627	9784	1631	803689
sd	206	1074	3673	355	111	1050	569	51542

Hillsborough FL

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2609	4621	27080	786	326	5483	2098	469324
sd	707	893	2509	175	44	692	348	44703

Jackson MO

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2215	3096	22223	969	350	4333	291	350201
sd	275	192	1310	187	10	513	98	18453

Appendix B

Summary Statistics by County and Industry (Continued)

King WA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	3833	11298	58367	3192	606	12305	2195	937522
sd	307	1360	4395	347	96	1121	377	79376

Los Angeles CA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	13225	41676	220229	7568	3050	37454	7385	3642603
sd	823	4533	16590	495	201	1820	714	178030

Maricopa AZ

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	7232	11608	86023	4253	390	24110	3865	1184269
sd	1496	2443	11610	238	89	1687	566	175169

Marion IN

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2591	5636	34302	2055	938	6471	1190	521489
sd	224	637	1246	163	77	362	153	32557

Mecklenburg NC

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1807	4654	25282	709	179	5485	1989	455104
sd	385	595	4130	275	38	573	459	55093

Montgomery PA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Automob ile rental	Aggregate employment
mean	1677	6809	21266	792	386	2557	676	471846
sd	91	955	1475	101	42	375	145	29514

Appendix B

Summary Statistics by County and Industry (Continued)

NY NY

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	469	27807	87737	4865	1095	32475	758	1936257
sd	68	5906	13465	706	161	3467	71	114281

Nassau NY

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2174	11340	30998	1049	556	2549	582	534799
sd	76	1565	2720	169	49	122	265	17203

Norfolk MA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1602	4500	17671	622	741	2473	205	316093
sd	92	824	2311	69	67	1842	25	24414

Oakland MI

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2777	9982	41063	1475	527	4123	698	718942
sd	156	1208	2998	195	32	433	298	61790

Oklahoma OK

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	2002	3526	25404	971	199	3042	1027	325661
sd	215	258	1592	117	12	291	328	19284

Orange CA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	4981	15506	83507	2559	777	18547	1870	1255281
sd	331	2607	8497	157	73	939	553	114135

Appendix B

Summary Statistics by County and Industry (Continued)

Orleans LA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	929	2627	18204	2129	179	11963	164	209703
sd	138	249	1225	454	39	989	56	2955

Philadelphia PA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1405	7849	28597	2182	630	6838	1227	590995
sd	49	585	1903	206	193	1005	209	11047

Prince George MD

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	1784	3733	16624	344	1247	2346	287	239669
sd	139	340	1000	39	120	412	70	11832

San Diego CA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Automob ile rental	Aggregate employment
mean	5491	13734	75884	3495	958	25229	1375	945293
sd	565	1941	7318	310	37	1740	171	107507

San Francisco CA

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	972	8268	35174	2756	358	20576	802	513943
sd	62	982	3810	178	66	2292	175	29589

St. Louis MO

stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Automob ile rental	Aggregate employment
mean	3336	6978	37582	802	239	5561	1349	562254
sd	193	504	3361	91	41	1047	218	28482

Appendix B

Summary Statistics by County and Industry (Continued)

	Wayne	MI						
stats	Gasoline service stations	Apparel and accessory stores	Eating places	Drinking places	Liquor stores	Hotels and other lodging	Auto-mobile rental	Aggregate employment
mean	3718	7548	47530	2792	1161	5795	1801	736309
sd	192	603	1360	160	159	1136	170	24050

Appendix C

Regression Results From Baade Model

Regression Results from Baade Model								
Dependent Variable, Industry Employment								
Variable	Aggregate	Gas Station	Apparel	Eating Places	Drinking Places	Liquor Store	Hotel	Car Rental
NFL	-0.00114	-0.00914	-0.00271	-0.00039	-0.03271	0.01071	0.00417	-0.02626
	(-1.08)	(-0.8)	(-0.2)	(-0.04)	(-1.09)	(0.62)	(0.23)	(-0.18)
NBA	0.00216	0.01093	-0.00138	0.00940	0.02423	0.07680	0.04362	0.34891
	(0.84)	(0.4)	(-0.04)	(0.4)	(0.34)	(1.94)	(0.98)	(0.57)
MLB	0.00040	0.02935	-0.00623	-0.01607	-0.02527	-0.00194	-0.00621	-0.11296
	(0.11)	(0.96)	(-0.13)	(-0.51)	(-0.26)	(-0.04)	(-0.1)	(-0.26)
Ratio county/ state pop	0.93759***	4.62845***	25.18423***	12.31066***	23.35473***	-1.36241	11.94073***	14.25428
	(5.59)	(6.91)	(6.83)	(12.24)	(6.22)	(-1.24)	(4)	(1.81)
Constant	0.05566***	-0.57294***	-2.63316***	-1.60159***	-0.94408***	0.13388	-1.51594***	-0.14473
	(7.78)	(-5.84)	(-20.6)	(-23.09)	(-3.63)	(0.68)	(-12.18)	(-0.37)
Number of Observations	387	387	386	387	386	384	387	365
$R^{2\,a}$	0.9028	0.8488	0.7662	0.8674	0.6575	0.8282	0.6649	0.5994
F	5.67	6.50	5.05	13.62	3.61	0.89	2.24	1.56

Note:: * p<0.05; ** p<0.01; *** p<0.01

a. Overall R^2 for the regression is shown. Within and between R^2 are not reported.

** t-statistics in parentheses.

Appendix D

Regression Results from Coates and Humphreys Model

Regression Results from Coates and Humphreys Model								
Dependent Variable, Industry Employment								
Variable	Aggregate	Apparel	Eating Places	Drinking Places	Liquor Store	Hotel	Car Rental	Gas Station
NFL	-10738.3	244.4053	628.5591	-159.276*	-14.7611	-39.7479	-50.8261	-90.7858
	(-1.66)	(1.08)	(1.29)	(-2.18)	(-0.62)	(-0.09)	(-0.64)	(-0.98)
MLB	3488.562	-748.669	-271.99	-83.9521	-2.3844	-1114.99	141.8974	826.0161
	(0.15)	(-0.93)	(-0.15)	(-0.34)	(-0.03)	(-0.7)	(0.61)	(2.56)
NBA	17602.31	285.1612	1225.557	223.9972	79.1036	587.1191	208.1754	84.94303
	(1.05)	(0.5)	(0.97)	(1.27)	(1.45)	(0.52)	(0.63)	(0.37)
Average aggregate employment	1.00614***							
	(10.9)							
Average apparel employment		-0.45198						
		(-0.43)						
Average eating places employment			1.00219***					
			(6.58)					
Average drinking places employment				-0.1894				
				(-0.23)				

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$
Overall R^2 for the regression is shown. Within and between R^2 are not reported.
t-statistics in parentheses.

Regression Results from Coates and Humphreys Model (Continued)

Regression Results from Coates and Humphreys Model (Continued)								
Dependent Variable, Industry Employment								
Variable	Aggregate	Apparel	Eating Places	Drinking Places	Liquor Store	Hotel	Car Rental	Gas Station
Average liquor store employment					0.403912			
					(0.84)			
Average hotel employment						1.013905		
						(3.89)		
Average car rental employment							0.113886	
							(0.45)	
Average gas station employment								0.989038
								(5.69)
Constant	-6017.85	14983.35***	-966.871	2830.496***	393.4167*	126.3568	1460.812***	-325.457
	(-0.6)	(7.88)	(-1.05)	(4.65)	(2.52)	(0.18)	(6.58)	(-2.47)
Number of Observations	387	386	387	386	384	387	366	387
$R^{2\,a}$	0.0354	0.0011	0.0184	0.1059	0.1600	0.0036	0.2643	0.1490
F	15.72	15.02	8.25	3.17	2.56	3.08	6.41	14.35

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$
Overall R^2 for the regression is shown. Within and between R^2 are not reported.
t-statistics in parentheses.